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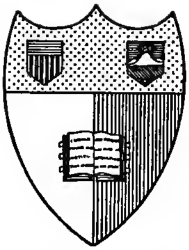

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MINUTES OF THE DISCUSSION

BETWEEN THE

Nile Projects Commission and the Committee of Egyptian Engineers.

AT THE

Public meeting held on 22nd June 1920.

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Application for copies to be made to Abdalla Pasha Wahby,

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ERRATA.

Page 8	14th line from the top fig. 30 should be 34.
Page 8	33rd line from the top fig. 1.9 should be 7.9.
Page 12	19th line. His Highness the Prime Minister should be His Excellency the Minister of Public Works.
Page 14	16th line. The fig. 1,000,000 should be 1,100,000.
Page 14	17th line. The fig. 3,100,000 and 1,100,000 should be 3,000,000 and 1,000,000.
Page 15	14th line should read "If figures on page 31 are correct."
Page 18	6th line from bottom. The fig. 54 should be 55.

PUBLIC MEETING

OF THE

NILE PROJECTS COMMISSION.

HELD AT THE LEGISLATIVE ASSEMBLY ROOM ON TUESDAY 22nd JUNE 1920.

◆

A meeting of the Committee of Egyptian Engineers and the Nile Projects Commission was held on Tuesday 22nd June 1920 at 9 a.m. in the Legislative Assembly room. Those who were present of the Projects Commission were:- Mr. Gebbie, Persident; Mr. Cory ,Member; Mr. Capes, Secretary, and his assistant, Mr. Wishlade. Doctor Simpson, the third Member of the Nile Projects Commission, was not present. Mahmoud Eff. Aly, the Engineer, came with the Commission for interpreting when necessary.

Those who were present of the Egyptian Engineers Committee were :— His Excellency Abdulla Pasha Wahby, Mohamed Bey Ismail, Abdel Kawy Eff. Ahmed and Ibrahim Eff. Zaki. Doctor Mahgub Bey Sabbit also attended. His Excellency Mussa Ghaleb Pasha, Member of the Egyptian Engineers Committee, was not present, and His Excellency Abdulla Pasha Wahby apologized for his absence, stating that he could not come on account of illness but that he had already explained his views regarding these projects, before the Commission, on their visit to him at his house at his invitation.

Sir Murdoch MacDonald, representing the Public Works Ministry, Mr. Molesworth, Inspector General of Projects, P.W.M., Sir Edgar Bernard, the Financial Secretary, representing the Sudan Government, Mr. Frazer, the Director of Lands Department, Sudan Government, Mr. Newhouse, Inspector White Nile Division, Mr. Prowde, Inspector Blue Nile Division, and Mr. Hurst, the Director of the Physical Department, P.W.M., were all present.

Mr. Gebbie. — " We have read your criticisms with very great interest, and want to ask you some questions." [He then gave his Excellency Abdullah Wahby Pasha a note which contained the summary of the criticisms written in the Report of the Egyptian Engineers Committee.]

Wahby Pasha. — Our report is an adequate answer to any question or explanations you want.

Our "criticisms" on these projects are only from the technical point of view without touching upon other matters and our main object is that they should be carefully studied and a correct and right conclusion arrived at.

Mr. Gebbie. — We merely want some further information. It is evident that Egypt is short of water, and the project for increasing the supply is criticised pretty strongly, and we would like to know if you have any proposals to put forward in order to obtain the extra supply

Zaki Eff. — The Committee of the Egyptian Engineers had no such opportunity of studying these Nile Projects like the British Engineers of the Public Works Ministry; so, the Committee is sorry to be unable to put forward their personal proposal regarding alternative projects. The Committee has confined its researches and investigations to pointing out the harmfulness of these projects; their main purpose is to prove that these projects are against the interests of Egypt and the Egyptians, and if they have proved this, then, the Egyptian Engineers are ready, when they have studied the Nile sufficiently carefully, to put forward alternative projects.

Mr. Gebbie. — Do you say that at the present time Egypt needs more water ?

Abdel Kawy Eff. — It is necessary.

Mr. Gebbie. — You have asked a number of questions and I believe a representative of the Public Works Department will reply to them (1).

Abdel Kawy Eff. — We wish to know whether the Sudan Government agrees with the projects in question or raises any objection and if the latter is the case, then what are the reasons for that ?

Mr. Frazer. — The Sudan Government is substantially in agreement. We are prepared to acquiesce in the construction of the Gebel Aulia Reservoir as it is in our interests, it may not be the site we should have chosen for ourselves, however, we raise no objection.

Sir Murdoch MacDonald. — The Irrigation Office of the Sudan is under the Irrigation Department of the Egyptian Ministry of Public Works, and as a ministry we decide what we think are the best schemes for developing the regulation of the Nile and the increase of water. The Sudan Government has never raised any objections .

---

(1) These questions have not yet been anwsered by the Ministry. Also the Ministry has no record of the Nile water that passed down to the Mediterranean.

Mr. Gebbie. — We may take it that the Sudan Government has no objections to these schemes.

Abdel Kawy Eff. — Was the basis put by Sir William Garstin, 15 years ago, which insists that the Public Works Ministry only should have the complete authority on the Nile from the mouth to the source, and considering Egypt and the Sudan as *one* body, followed in framing these projects ?

Sir MacDonald. — Yes.

Abdel Kawy Eff. — Why is a representative of the Sudan Government here in this committee and also in the previous ones ?

Sir MacDonald. — The Sudan Government representative will answer that.

Mr. Frazer. — Some criticisms were put forward against the Sudan Government, so we came to prove their unsoundness.

Abdel Kawy Eff. — Why does the Sudan Government Representative answer this ?

Sir MacDonald. — I have replied. I am acting as Adviser to the Sudan as well as Adviser to the Public Works Ministry of Egypt, and the Sudan Government are fully entitled to be heard as the projects may affect them.

Wahby Pasha. — If the Adviser for the Public Works is representing them, why has the Sudan Government made an agreement with the Sudan Plantation Syndicate, agreeing to give them water, land, and also money, without his knowledge ?

Sir MacDonald. — I am their representative for the engineering side, I do not know anything about that.

Wahby Pasha. — How can it be that the Sudan Government makes a contract with a company and agrees to give them what is stated above, without showing the Egyptian Government the contract terms, though these projects were submitted to the English Parliament and approved by his Majesty the King on the 15th of August 1919 and signed by Sir E. Bernard as representative of the Sudan Government and by the English Company on the 17th October 1919; and all this was accomplished in a secret manner.

Sir Bernard. — It is *not* secret and I am ready to let you know its summary.

Wahby Pasha. — The agreement is absolutely secret because it was not published in any Egyptian newspaper up to the present. Moreover, our Committee asked for a copy of it from His Excellency the

Prime Minister in a letter dated 14th May 1920 and it has not been answered till now in spite of the vital importance of knowing the quantity of water agreed upon to be given to the Syndicate and what its effect on Egypt will be [His Excellency read the letter as mentioned in the report submitted by the Egyptian Committee, page 11].

Mr. Gebbie. — This discussion has nothing to do with engineering matters and the Commission are not concerned with it.

Wahby Pasha. — I request you to put down this point in the minutes of your proceedings.

Mr. Gebbie. — No objection.

Sir Bernard. — As the Pasha has mentioned this to-day, I wish to state there has been no secrecy. As a matter of fact the conditions of the agreement have been published in newspapers, both English and Egyptian. There is nothing whatever secret about it, and if they wish to come to my office I will give them full facilities. It is only an arrangement for a period of 10 years, which may be increased to 14 years if the scheme turns out satisfactory. This scheme is in the interests of all concerned. The Government will get all the supervision done without having to employ a large staff of officials etc., and at the end of this period the entire scheme will become the property of the Sudan Government and the Sudanese. The land remains the property of the Sudanese.

Mr. Gebbie. — This discussion is not relevant, and it must stop.

Zaki Eff. — " Discussions on the technical problem " :— We beg to draw attention to the table in Page 32 of the Nile Control where will be found the water requirements of Egypt and if the figures in that table are proved to be incorrect, then the projects will be false, because they are based on that table and we will also explain that the adviser does not understand what is written in that table. We beg therefore to answer as follows :—

In the heading of the fourth column from the right of the table mentioned, the sign + will be found and at the bottom its explanation says that the figures in that column do not contain the water necessary for navigation in the river. Is that true ?

Sir MacDonald. — No, the sign + was put wrongly by the printers and the explanation below the table shows that the figures of *all* the table do not contain the water for navigation.

Zaki Eff. — Does the fig. 30 in the fifth cloumn opposite Mr. Hurst's name contain the water for navigation ?

Sir MacDonald. — Yes, it contains the water for navigation.

Zaki Eff. — This does not coincide with your first answer in which you said that *all* the figures in the table do not contain the water for navigation, so which are we to take ?

Sir MacDonald. — From page 31 you will see that the figure 30 contains the water for navigation.

Zaki Eff. — If that figure contains the water necessary for navigation, then do all the figures in the same column contain the water for navigation ?

Sir MacDonald. — No.

Zaki Eff. — Then how do you put figures with different meanings in the same column and under the same heading ?

Mr. Gebbie. — What do you mean by asking these questions ?

Zaki Eff. — In order to prove the disorder and complication of the table and also that the adviser does not understand anything in that table.

Mr. Gebbie. — Methodical arrangement is one thing and the correctness of the figures is something else, so are the figures correct ?

Zaki Eff. — How can they be correct ? Will you see the figure 30 again and tell us whether this figure denotes the total water requirements, as stated in the heading of the column, or does not contain the "Basin Water" as stated in Page 31.

Sir MacDonald. — It does not contain the Basin Water.

Zaki Eff. — Do the other figures in the same column contain the Basin Water ?

Sir MacDonald. — Yes, they do.

Mr. Gebbie. — I don't care about the order of the table. Is the figure correct ?

Sir MacDonald. — In the margin of the table it is stated that the Basin Water, which is six milliards, should be added to the fig. 30.

Zaki Eff. — How do you estimate these six milliards for the basins while you stated, in page 51 of the Nile Control, that in a period of 40 days commencing the 10th August, the basins take their water at an average depth of 1.80 ms. If we consider this as correct, then the water requirements for the basins will be :—

1,300,000 × 1.80 × 4,200 × 120/100 = 11,900 say 12 milliards and *not* six milliards.

Sir MacDonald. — But, as stated on page 51, a depth of water of sixty cms. goes back into the river.

Zaki Eff. — Yes. But you stated (in the same page) that the water that goes back into the river is not used in irrigation, as the cultivated areas are not in need of it. So how do you bring in this amount of drainage water into your estimate, while at the same time you say that it is no use for cultivated lands ?

Sir MacDonald. — I am content to say that six milliards are enough for basin irrigation, but I leave this point for the Commission's decision and judgment.

Zaki Eff. — That is good. Let us go back to the fig. 30 again, to which if we add the six milliards, for the basins, as you say, and an allowance of 10 % for the losses according to your estimate in the table, then the total will be about 40 milliards, and *not* 30 as stated in the fourth column under Hurst's name.

Sir MacDonald. — No. The figure 30 contains the losses as shewn on page 31.

Mr. Gebbie. — What do you mean by all this discussion ? The table being in disorder does not interfere with the correctness of the figures.

Zaki Eff. — How can these figures be correct while the fig. 30 is entered in the fourth column bearing the heading of " Present-day requirements for all Egypt at Canal Heads." This means that the fig. 30 does not contain the losses between Aswan and the Canal Heads.

From these investigations, my only purpose is to prove that the figures do not mean anything in connection with their heading, and the Adviser does not understand how this table was made. So, the fig. 30, which is our point of investigation, does not contain the water for navigation and losses between Aswan and the canal heads, but it contains the water necessary for basin irrigation viz, six milliards according to his estimate while the figure 30 represents the water taken by the canals at the Delta Barrage, equalling 16.5 milliards; add what was taken by the Ibrahimia Canal which is 1.9 milliards, add to this 6 milliards for the basins and deduct .7 milliards seepage; the result will be 29.700, say 30 milliards.

This is quite different from what the Adviser said now.

Mr. Gebbie. — Il these figures submitted by the Ministry are incorrect and you have correct figures, then please offer them.

Zaki Eff. — All the Ministry figures are inaccurate and they were purposely made so to lessen the water requirements of Egypt, so as to enable the Ministry to spare a quantity of water for the Sudan and to prove the benefit of the Gebel Aulia Reservoir which will lose about four milliards of water in evaporation, etc. uselessly while Egypt will require all that quantity of water in a year like 1913-1914.

Sir MacDonald. — " Zaki Eff. I know that you speak English well, so please speak in English."

Zaki Eff. — I know English but not in such a manner as to enable me to discuss fluently in it, but, in answer to your request, I will speak both in English and Arabic, but the latter should be taken in consideration only, and the interpreter must correct any mistakes in any translation.

Zaki Eff. — The most important point in our problem is the estimation of the present cultivated area in Egypt. Secondly, the water requirement for one feddan in the different seasons, so we will begin estimating the cultivated area :—

The area of lower Egypt cultivated under summer crops :—

3,100,000 feddans and not three millions as the Ministry estimate.

Sir MacDonald. — We have considered, in estimating the cultivated areas, the last Survey Department estimates.

Zaki Eff. — I have considered in my estimate :

(1) The Survey Department.

(2) The technical books studied in the Engineering School.

(3) The Government Official Reports.

(4) The Ministry's words which were quoted unwillingly and were not followed in the present estimate. The following are the proofs :-

1. In the report 1914-15 page 12, it is stated that the cultivated area of Lower Egypt is 3,094,949 feddans and this is distributed amongst the Irrigation Circles.

2. In the 1915-1916 report page 75, it is stated that the area cultivated in Lower Egypt is 3,097,941 feddans distributed among the different Irrigation Circles page 74, and in page 75 distributed among the provinces. It is also stated at the top of the latter page that the mentioned figures are taken from the Survey Department.

3. From the Annual Census of the Egyptian Government for the year 1916 page 114 we find that what has actually been cultivated in Lower Egypt is :—

1905-1906 — 3,132,538 Feddans.
1906-1907 — 3,167,077 ,,
1907-1908 — 3,174,627 ,,
1908-1909 — 3,122,411 ,,
1909-1910 — 3,100,233 ,,

4. From the Annual Census for the year 1916 page 114 we find that the average cultivated area for 15 years, from 1901-1902 to 1915-**1916, is 3,100,000 feddans.**

5. It is stated in page 31 of the Nile Control that the area under summer crop in the years 1912, 1913 and 1914 is 3,100,000 feddans.

6. In "Egyptian Irrigation" 3rd edition by Sir Willcocks page 109 it is stated that the cultivated area of Lower Egypt is 3,100,000 fedd.

So, I do not think, that after offering all these proofs one after the other for checking, can any one trust the Ministry's figure of 3 millions and does not consider our figure of 3,100,000 feddans.

II. The cultivated area of Upper Egypt is 2,300,000 feddans and *not* 2,200,000 as said by the Ministry. The following are the proofs :—

1. In "Egyptian Irrigation" page 109, the cultivated area of Upper Egypt is 2,251,000 feddans.

2. In "Nile Control" page 23, the perennially cultivated area of Middle and Upper Egypt is one million feddans, and the basins area is 1,300,000 feddans, that is, the total area of Upper Egypt is 2,300,000.

3. From the general annual census for the year 1916 page 114, it is stated that the average cultivated area of Upper Egypt in the period of 15 years up to 1916, with the addition of sharaqui lands according to the lowness of the Nile water surface in some years, as stated in page 136 in the above mentioned census, is 2,300,000 feddans at present.

III. The cultivated area of Upper Egypt, as mentioned, is 1,300,000 under perennial irrigation and 1,000,000 feddans under basin irrigation.

Mr. Gebbie. — You have reversed the Ministry's figures making the Basin Perennial and vice versa.

Zaki Eff. — I have purposely done that because it is the right way and here are the proofs :—

1. In "Nile Control" page II it is stated that the area of the basins and berms in Upper Egypt is 1,280,000 feddans, of which 240,000 feddans are under perennial irrigation.

Sir MacDonald. — Please read to the end so as to understand the rest of it.

Zaki Eff. — Please don't interrupt me. I understand everything so wait until I complete my speech then discuss what you like.

I have said that it is stated in page 11 of the "Nile Control" that the area of basins and berms is 1,280,000 feddans of which 240,000 feddans are cultivated perennially, some by machinery on the Nile and some irrigated from wells in the basins. If the Ministry meant to make an accurate estimate, it should have estimated what is irrigated from well and that from the Nile separately and deduct the former from the estimate. But at any rate we will consider the basins areas as :—

1,280,000-240,000 = 1,040,000 feddans say one million only ; then the perennially cultivated area of Upper Egypt will be 1,300,000 feddans.

2. The point previously stated taken from "Nile Control" is exactly the same as that written in "Egyptian Irrigation" third edition just as if it was copied from it.

Mr. Gebbie. — You go very far with your researches.

Zaki Eff. — This is because I fight for the benefit of my country and for that, I wish to prove all what I say in a right manner, eventually I will be well equipped to fight against the false proofs and estimates which the ministry advances to crush our investigations and criticisms.

Mr. Gebbie. — Will you be as brief as possible. It is not necessary to offer any books and it is enough to mention only their names and the number of the page quoted. The summary of what was stated is that you wish to consider the following :—

3,100,000	feddans	in	Lower	Egypt	under	Perennial Irrigation
1,300,000	,,	,,	Upper	,,	,,	,, ,,
1,000,000	,,	,,	Upper	,,	,,	Basin ,,

5,400,000 feddans for the whole of Egypt and not 5,200,000 feddans as the Ministry states.

Zaki Eff. — Yes.

Mr. Gebbie. — That is good.

Zaki Eff. — Let us estimate the duty of water per feddan, at the present, in short not criticising the Ministry figures, but assuming them to be correct. We will take Mr. Dudgeon's (Adviser of Agriculture) and Mr. Molesworth's figures which are both entered in the " Nile Control," the former in page 19 and the latter in page 23 and the results obtained are as follows :—

Dudgeon's Estimate	Molesworth's Estimate	Average.	
6588	6822	6705	for Lower Egypt.
7187	6562	6874	for Upper Egypt under perennial Irrigation.

Therefore the water requirements for the present perennially cultivated area at the canal heads will be :—

3,100,000 × 6705 = 20.8 Milliards.
1,300,000 × 6874 = 8.9 ,,

29.7

And as the Ministry estimates, for the Basin Irrigation of one Feddan at the Canal head, 5040 cu. ms., although we should not consider that figure and we must take 7600 ms. cu. as correct, as stated and explained before. While the Adviser puts this point for the Commission's decision, yet we will consider it as it stands. Therefore, the one million feddans under basin irrigation will require 5.04 milliards at the canal heads.

Then the average requirements of Egypt at the present will be :—

29.70 + 5.04 = 34.74 if we deduct .7 milliards for seepage and add 10 per cent for the losses as shewn in " Nile Control " page 32, we will get the water requirements to be 37.44 milliards. If we add 5 milliards which are necessary for navigation, and for keeping the river section on its natural form, as the Ministry's estimates, we will get :

42.500 milliards and *not* 35.500 milliards as the Ministry estimates.

We have shewn clearly that Egypt requires 42.50 milliards and not 35.5 milliards as reported in the Ministry's estimate. It will be seen that the " Basins Water Requirements " are only six milliards according to the Ministry's estimation, but we have previously shewn that the correct figure should be nine milliards considering that the area is only one million feddans, and we left this point for the commission's judgment and decision.

Accordingly, Egypt's present requirements are 42.5 milliards and it is undeniable that this is a specially sacred right for Egypt on the Nile waters.

Mr. Cory, a member of your commission, admitted that right and stated that it could be estimated from the amount of water actually taken by Egypt in the last 10 years.

Mr. Cory. — Yes.

Zaki Eff. — We have requested, by letter dated 8th March 1920, his highness the Prime Minister, and again by a letter dated 13th March 1920, and lastly your Commission on the 14th June 1920, to send us the Nile Discharges observed at Aswan for these ten years, also the water that has passed down to the sea in the above mentioned ten years, for estimating the quantity of water actually taken by Egypt in those ten years. But neither the Ministry, nor you, have sent us this information up till now. Thus we were compelled to follow a technical way for estimating the above, and had to be satisfied to consider only seven years as that was all what is given in " Nile Control."

Mr. Cory. — This is adequate.

Zaki Eff. — We have sent these estimates and calculations to your commission, and I beg you to return them now so that I can read them to you as we have no duplicate.

The President to Mr. Capes : Where are these ?

Mr. Capes. — Here they are.

The President. — Are these calculations and estimates shewn in detail in your papers ?

Zaki Eff. — Yes.

The President. — That is enough ; we will read them and study them carefully.

Zaki Eff. — From the estimates we offered to you, we find that Egypt has a sacred right to 45 milliards at present. From what is mentioned above, we see that Egypt requires 42.50 milliards, considering the Ministry's estimate, for the basins, which is six milliards, but her actual requirements are 45 milliards. So, in a year like 1913-1914 when the total discharge of the river was not more than 41 milliards, Egypt cannot spare even a drop of water for the Sudan or for the construction of the Gebel Aulia Reservoir which loses about four milliards in evaporation etc.

The Public Works Ministry, to be able to go on with these projects, has estimated Egypt's requirements, what will be lost by evaporation etc. in the Gebel Aulia Reservoir, and the water requirements for the Sudan, as follows :—

35.5	milliards	Egypt's requirements.
3.2	,,	what will be lost by evaporation etc. by the Gebel Aulia Reservoir combined with Aswan.
1.6	,,	Sudan requirements for 300,000 feddans considered with Aswan.

40.3 milliards which is less than the lowest year of 1913-1914 when the total river discharge was 40.7 milliards. We have proved that this basis is incorrect, and explained that Egypt alone requires 45 milliards at present. Accordingly, any amount of water taken by the Sudan, before the increase of the water supply, will undoubtedly be against the interests of Egypt and very harmful, also the construction of the Gebel Aulia Reservoir whose losses will be about four milliards in evaporation etc., also any lands in the Sudan cultivated by the basin system, will also be most harmful to the interests of Egypt.

Our statement agrees with what Sir William Garstin thought when he proposed the scheme in 1902-1903 long before the English syndicate had been formed.

But when the Sudan syndicate was formed the interests of Egypt were overlooked and the projects suddenly become useful from every point whereas a short time before they had been considered both objectionable and harmful.

Mr. Gebbie. — You say that Egypt requires at least 42 1/2 milliards and not 34 as estimated by the M.P.W.

Zaki Eff. — Yes.

Mr. Gebbie. — What else ?

Zaki Eff. — On P. 23 we have the following calculations :

1,300,000 × 4,200 × 120/100 = 6,000.

The product is wrong. It is not so ?

Sir MacDonald. — That is a misprint.

Zaki Eff. — The equation consists of 4 figures. In which of these does the misprint occur ?

Sir MacDonald. — The figure 1,300,000 representing the total area of the basins should be 1,200,000.

Zaki Eff. — That is not true. If we refer to p. 11 in which you have stated the area of the basins and the area of the whole country in detail we shall find that you have estimated the area of the basins at :

1,280,000 feddans or in round figures 1,300,000.

And in the "Egyptian Irrigation" 3rd edition p. 344 this area is estimated at 1,286,635 i.e. 1,300,000.

Figure 1,300,000 is therefore true. There is no misprint in it. The product is purposely reduced in order to underrate Egypt's requirements.

Sir MacDonald did not answer.

Zaki Eff. — On pages 19, 23, 26 on which Egypt's requirements of water are estimated by the M.P.W. the area of Lower Egypt is considered to be 3,000,000 fed. The area under the basin system in Upper Egypt is estimated at 1,000,000. But on p. 31 when Egypt's future requirements were considered, the area of Lower Egypt is estimated at 3,100,000 and that the area under basin irrigation at 1,000,000 instead of 3,100,000 and 1,100,000 respectively.

Why is it that different figures are adopted for the same subject in the same memorandum ?

Sir Mac. — There is no reason. Only in the first case we are dealing with Egypt's present needs whereas in the other we are dealing with Egypt's future requirements.

Zaki Eff. — That does not necessitate a change in the area increasing it in one case and decreasing it in another. In both cases the area should be the same for they both deal with the present area under cultivation. The change is purposely made to lessen the amount of water required by Egypt in both cases. The following is my proof :—

On pages 19, 23, 26, the figures representing the areas are used as multiples. Whenever the figures are reduced the product, i.e. Egypt's water requirements at present, is reduced. It is for this reason that the M.P.W. underestimated the area of the cultivated lands.

On p. 31 the figures are used as dividends; and so by reducing them the result, i.e. Egypt's water requirements, is reduced. This is why the true figures are used although they are greater than the figures formerly employed.

Sir Mac. — You are comparing different cases.

Zaki Eff. — I am simply stating the area of Egypt at present which should be one and the same. These calculations were revised by the M.P.W. No contradictory figures should therefore be allowed especially in this case. The only explanation is that the M.P.W. has some aim in changing the figures.

Sir Mac. — What do you mean ? The calculations in the former pages and those on p. 31 were made by different persons.

Zaki Eff. — I know that. Will you allow me to come near you so as to explain to you the aim of the M.P.W. in doing so.

Sir Mac. — Of course.

Zaki Eff. — It is true that the figure on p. 31 is Mr. Hurst's and those on p.p. 23, 26, 19 are given by other men, but the Ministry that has published the book should have read over the book before publishing it as the responsibility falls upon it. By increasing the area at one time and decreasing it at another the M.P.W. compromises itself, especially when this increase and decrease leads to the reduction of Egypt's water requirements.

Mr. Hurst. — My figures mentioned on p. 31 represent the area cultivated in 1912, 1914. I have adopted them from the reports of the Survey Department. This is not the case of the figures on p.p. 23, 26, 19.

Zaki Eff. — I know that. If figure 30 is correct why then was it not adopted as the basis of the calculations on p.p. 19, 23, 26, when Egypt's water requirements at the present time were considered ?

The obvious reason is that by adopting it as a basis of the calculations on p.p. 23, 26, 19, the water needed by Egypt at present will be much greater thus leading to the downfall of the projects.

I require five minutes rest as I have got tired.

Mr. Gebbie. — All right.

Zaki Eff. — Abdel Kawy Eff. Ahmed will speak.

Abdel Kawi Eff. Ahmed. — I wish to speak about Egypt's water requirements not during the whole year but during the two months of August and September.

In the table on p. 66 Egypt's requirements in those two months are considered to be 10.73 milliards.

To estimate the accuracy of this figure we shall consider its items.

Irrigation in Egypt is carried on in two ways, perennial and basin. Perennial irrigation is carried on in Lower and Middle Egypt, basin irrigation in Upper Egypt. We shall consider the amount of water required by each of these three divisions.

[Here Mr. Hurst drew the attention of Abdel Kawy Eff. to the heading of the table spoken of which is " The Ideal Requirements of agriculture at Present including the Basin Waters "].

Abdel Kawy Eff. asked whether this was not the amount that should be given to Egypt in those two months at the present time as mentioned in the table. Mr. Hurst answered in the affirmative.

Abdel Kawy Eff. then went up to the blackboard to prove that Egypt requires more than the amount given by the M.P.W.

On p. 66 of " Nile Control " it is stated 10.73 milliards but :—

1. The area of the basins as stated in " Nile Control " is :

1,200,000 feddans. The height of the water as stated in " Nile Control " is 1.80.

Therefore 1,200,000 fed. × 4,200 × 1.80 = 9 milliards is the water required for the basins.

2. The area of Lower Egypt as stated in " Nile Control " is 3,000,000 feddans.

The requirement per feddan in the two months is (837 + 889) c.m.
This gives about 5 milliards.

3. The area of the land under perennial irrigation in Upper Egypt is 1,100,000 feddans.

The requirements per feddan in the two months are (1070 + 1110)c.m.
This gives 1,100,000 × (1070 + 1110) × 5250/6850 = 1.8.
Total about 16 milliards at canal heads.

By adding to this figure 10 per cent which is the amount wasted by evaporation and seepage, etc., from Aswan to the Canal heads we get about 18 milliards.

Mr. Gebbie. — From the foregoing arguments I understand that the Committee estimates Egypt's requirements at 42 1/2 milliards whereas the M.P.W. estimates these at 34.

[The Adviser then asked Mr. Hurst to answer, telling him that the table on p. 66 is of his own making].

Mr. Hurst. — The heading of the table is " The Ideal Requirements for Present Irrigation including the Basin Waters'.

Abdel Kawy Eff. — Do I understand that this is what should be given to Egypt in these two months ?

Mr. Hurst. — Yes. But you have compared the tables of different men.

Abdel Kawy Eff. — I know that the result is the Adviser's but the items are Mr. Hurst's. What I criticise is that the difference in the two statements should be in the proportion of 10 to 18.

Sir Mac. — Mr. Molesworth was too generous and his calculations were based on the statements of the fellaheen.

Wahby Pasha. — May we rely upon the estimates of Mr. Molesworth and Mr. Yennidunia when they give the water required by Egypt at present ?

Sir Mac. — Mr. Yennidunia made the estimates and Mr. Molesworth is responsible for them. Mr. Molesworth has agreed with us to reduce the Egypt future requirements from 66 milliards to 58. He has based these estimates on the statements of the fellaheen who cultivate and irrigate the land.

Mr. Molesworth. — The 58 milliards are based on the estimates of the fellaheen who always exaggerate their needs.

Wahby Pasha. — We cannot accept these statements : We have all worked with you in Irrigation and cultivation. This statement of Mr. Molesworth should not be made to a man like myself. We never relied upon the statements of the fellaheen who have no knowledge of what their lands require.

I wonder why the estimate of Mr. Molesworth after being 66 milliards was lessened to 58; while at the same time, it is said to be taken from the farmers. After all that, the Adviser does not consider either the former or the latter, and considers only 50 milliards.

At this moment a farmer who was present at the meeting sent a card to H.E. Abdalla Pasha Wahby from which the following was read : " I am sure that there is not a single fellah who can estimate the amount of water required per feddan either by the metre or the litre. The only thing he knows is what time the feddan requires to be irrigated." It therefore appears that the fellah cannot estimate in cubic metres or in litres the amount of water required per feddan. Mr. Molesworth is not justified in saying that he has based his calculations on the statements of the fellaheen.

Mr. Newhouse. — The fellah estimates the depth of the water by the fist and then Mr. Molesworth changes this into cubic metres or litres.

Wahby Pasha. — We have ascertained lately that Mr. Molesworth and Mr. Yennidunia made a detailed statement of the requirements of Egypt in which they mentioned the quantity as being about 67 milliards. Will Mr. Molesworth be kind enough to shew it to the commission?

Mr. Molesworth. — I do not remember that statement.

Wahby Pasha. — But if I offer a copy of the above statement ?

Mr. Molesworth. — I will be much obliged. [He then left the meeting and went away].

Wahby Pasha, then, promised to give the commission a copy of the above (1).

Sir MacDonald has confessed in front of the Commission that Mr. Molesworth estimated that Egypt's requirement are 66 milliards and they agreed together to reduce that figure to 58, after that, the figure was reduced again to 50 milliards without understanding why this was done, also the Adviser brought forward, in his book "Nile Control," Mr. Dudgeon's estimate as 53 milliards, but the latter (formerly Technical Adviser to the Ministry of Agriculture) is a specialist in agriculture and not in engineering. Also Mr. Hurst's estimate which is 51 milliards; but he is a specialist in Physics, who was told by the Ministry to collect all the statements and notes given to him and put them together in the form of a book which was eventually called, by the Adviser, " Nile Control."

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(1) A copy of the above Statement was sent to Mr. Capes, the Secretary of the Commission, in London, on the 9th July 1920, also a copy was given to Mr. Cory, the American member of the commission on the 5th July 1920. The Statement proves that Egypt's requirements are 67.522 milliards.

It was anticipated, from a technical point of view, that the Adviser will consider Messrs. Molesworth's and Yennidunia's estimate of 66 milliards because they have based their estimates on actual observations and experiments, and also they are able and practised engineers.

From this and from the proofs we have given both in our report and here before you of all these complications, it is clear that all the calculations are based on the opinions of individual persons whose statements are full of discrepancies and contradictions. So is all this not sufficient to make us doubt the accuracy of their estimates and to prove that any study that was made of the schemes was made by individual persons and was not based on true scientific grounds ? If this is so is it not advisable nay indispensable that these projects should be carefully studied by an impartial committee of English, French, American, Italian and Egyptian engineers ?

Has it not come to the knowledge of the Commission that when France, a country which is full of capable engineers — wanted to construct works for the irrigation of certain areas it has asked engineers from different parts of the world to submit to the French Government various schemes for the construction of these works? In acting thus, the French Government desired to avoid any mistake, that might otherwise be made if these works were studied by its engineers alone ?

Is it not reasonable that the Nile Projects should also be dealt with in a similar manner ?

Zaki Eff. — Let us suppose that the estimates of Mr. Molesworth are wrong because they have been based upon the statements of the exaggerating fellaheen. Will the Adviser be kind enough to explain to us the means, theoretical or practical, on which the M.P.W. has based its estimates of the water required by this country and has found out that the amount needed is 50 milliards and not 58 as stated by the exaggerating fellaheen ?

I shall save the Adviser the trouble of answering my question, for this answer is to be found on p. 34 of " Nile Control."

.... " The adopted mean for monthly requirements is based on estimates *b* and *c* reduced to give a total of 50,000 millions. This figure was taken as being the nearest round number to the mean of the estimates." ..

This means that the ministry has not based its estimates of the water required every month on solid scientific grounds but, on the contrary, has built it on the average of the estimates of Mr. Molesworth and Mr. Cooper. This average was then reduced at haphazard, so that the total should not exceed 50 milliards. The M.P.W. states that the " figure was taken as being the nearest round number to the mean of the estimates of Mr .Molesworth and Mr. Cooper."

But this is not true. For the mean is 53,300 (Mr. Molesworth's estimate being 58,400 as given in p. 34 and Mr. Cooper's 48,200). The nearest round figure is therefore 54 and not 50 milliards. More surprising still is the fact that the ministry having estimated the water requirements every month of the year (upon no basis of course) and having found out that they make a total of 52 milliards has intentionally inserted 50 instead of 52.

Sir MacDonald. — This is not true. The total is 50 and not 52.

Wahby Pasha. — The total is 52. I have previously drawn your attention to it.

Zaki Eff. — Will you kindly go over the addition.

Sir MacDonald. — It is true that the total is 52 not 50 but this is a misprint.

Zaki Eff. — It is always so. Whenever we catch you out you say it is a misprint. You then change the figures and cannot give any proof of their accuracy. That is because your estimates are based on no scientific grounds and so it is impossible to discuss them with you. They are simply put hap-hazard and for this reason you can and do make any change you like in them.

Such projects as these costing, as they do, some 35 million pounds should not be so full of these so-called misprints unless the authors are able to prove that they are really misprints and not intentional faults purposely made to reduce Egypt's water requirements and thus make it appear that much water can be spared by Egypt to the Sudan.

It is not strange that all these misprints are all against Egypt and that not one of them turns to the good of the country ?

Zaki Eff. — To-day I have given my opinion as a member of the Committee of Egyptian Engineers. But I have also submitted to the Commission other criticisms of my own which I am ready to prove and explain. At the same time I wish to submit a scheme which if carried out will cause no harm to this country and furthermore it will spare to the Sudan more water than the ministry's projects would afford. The criticisms I have submitted are 50 in number.

The President. — Will to-morrow suit you ?

Zaki Eff. — I have no objection.

The President. — The discussion will be private not public as has been to-day. Do you agree ?

Zaki Eff. — The discussion will be purely technical; so I have no objection to its being private.

The President. — Let the meeting be to-morrow at 10 a.m.

Wahby Pasha. — On reading the English version of our report (as translated by the Nile Commission's translator) we found various discrepancies and omissions which may give a wrong idea of our criticisms. We have therefore prepared a correct translation of the report,(1) a copy of which will shortly be sent to you and this is the one to be depended upon.

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(1) The corrected translation of the Criticism by the Committee of Egyptian Engineers was sent to the Secretary of the Nile Projects Commission on 26th June 1920.

Mr. Gebbie. — Thank you.

Wahby Pasha. — The Ministry states that 1913-1914 was the lowest on record. But we have submitted to you a list in which there are 82 records which are much less than that of 1913-1914. This list comprises records taken from 629 to 1913.

An Egyptian historian submitted a manuscript written in 746 H. The M. S. is called "Al Nugoom el Zarira fi Akhbar Mulook Misr Wal Kahira." With this MS. was a memorandum which is an extract from it. This memorandum explains the distress which occurred in Egypt in the above year. Sir MacDonald asked him to read it and it was read as follows :—

" In 746, Mohamedan Calender, the Nile was very short of water to such an extent that the people waded across from the gauge and Old Cairo. There was a road across from Boulac to Kasr El Eini Beach, i.e., from Boulac to Gezeret El Nil, and thence to Kasr El Eini. The water went so far from the shore that water carries had to get it from opposite Embabah and the price of the water skin contents went up to 2 dirhams after one eighth of a dirham. The people complained to Irghan El Alli who informed the Sultan of the high cost of water. The Sultan with the Princes and many engineers, rode down and found that it was too late to increase the Nile waters, and it was decided to put the embankment across from Geezah to the Gauge to deviate the water to Cairo. This was done by transporting earth by boats, and when the bank was made, the water came slightly to Old Cairo Beach; but when the water got too high for the bank it breached, and was washed away.

Sir MacDonald. — Is the case mentioned in the manuscript in the flood period ?

Moh. Bey Ismail. — It is said that it was in the flood time.

Sir MacDonald. — Your strange book, Pasha, proves the need for these projects. Will you kindly give me this extract to translate.

Wahby Pasha. — You may have it and the book too. Mohammedan Law, Napoleonic Law and heavenly Law all forbid the taking of water from the Blue Nile for the benefit of the Sudan so long as Egypt has a sacred right in all the Blue Nile waters.

The Committee of native engineers has shown you that the aim of the projects is to give the water of the Blue Nile entirely to the Sudan and that of the White Nile to Egypt in future. The water of the Blue Nile is indispensable to Egypt owing to the fertile silt it contains and on which the productiveness of Egypt depends. But the water of the White Nile is poisonous and harmful and so we object to the construction of any dam across the Blue Nile; for this will endanger the life of the Egyptians and deprive them of the rich silt of the Blue Nile. The Committee of native engineers begs the Nile Commission to investigate the matter carefully and not to leave such important projects in the hands of private individuals.

Sir MacDonald. — We do not keep the water of the Blue Nile entirely for the Sudan and that of the White Nile for Egypt.

Abdel Kawy Eff. — Abdalla Pasha does not say that this is the case at present but that this is what is intended in future.

[He then read an extract from the "Nile Control" to prove this.]

Abdalla Pasha. — Egypt needs all the water of the Blue Nile in summer and therefore no summer crops should be grown as these would take the summer water required by Egypt.

Sir MacDonald. — The Gezira will not take the water of the Blue Nile in summer. It will simply take the flood water of the Blue Nile which will be stored at Mikwar instead of being wasted into the sea. After the 19th of January all the water of the Blue Nile will pass freely to Egypt, for the water of the Makwar reservoir will be sufficient for agriculture in the Sudan.

Zaki Eff. — But this water which will be taken by the Sudan is the right of Egypt; for in a year like 1913-14 there is no surplus water during or after the flood which can be taken by the Sudan. The cultivated land of Egypt needs even at the present time all the flood water.

Sir MacDonald. — This is another point. If it is proved that the water of the Nile is not more than the requirements of Egypt as you say, then the Sudan should not take any water.

The Commission will decide this point.

Zaki Eff. — One question more. Why is it that the Sudan should take all its water from the Blue Nile and not from the White Nile.

Has the M.P.W. any objection to the fact that the Sudan should take its proportionate share from the main Nile, its tributaries, and its lakes as Egypt does ?

Sir MacDonald. — Of course there is no objection. It is only fair and just that this should be the case.

Mr. Cory. — The Commission has now fully understood all that the Egyptian Engineers want to say. These criticisms will be carefully considered by us.

Abdel Kawy Eff. — The Egyptian Engineers come here before the Nile Commission and have not criticised the Nile Projects for the mere sake of criticism or for the purpose of depriving the Sudan of its share of the Nile water. Egypt and the Sudan are one inseparable whole. But we have seen the various discrepancies in the figures taken as the basis for these schemes. As Engineers we have simply answered the invitation of the Nile Commission which has asked every body who sees any fault in the scheme to lay it before it. We have noticed the strange way by which these schemes were studied, we have seen the truth set aside and for this reason we have come here. As Egyptians it did not behove us to appear before this commission admitting that it has the right to give the final decision in these vital schemes. We still believe that the decision should be postponed, not only because of the faults that have appeared in the projects themselves, but because the political status of Egypt has not been fixed. As the political problem is on its way to solution, the projects should, as a matter of course, be postponed.

MR. GEBBIE. — Political problems should not interfere with our investigation which is purely in the technical points.

WAHBY PASHA. — On that ground we have come here hoping that we should assist you to arrive at the truth which, we hope is the aim of us all.

SIR MACDONALD. — Although there is some difference of opinion between the M.P.W. and Abdalla Pasha Wahby and his colleagues in the purely technical points, yet I feel much obliged to them for the honest, unbiassed interest they have taken in the Nile Projects.

WAHBY PASHA. — The Committee of Egyptian Engineers thank you for this acknowledgement.

THE MEETING THEN ENDED at 1 p.m.

The Commission promised Ibrahim Eff. Zaki to make a private meeting in the next day to discuss with him in his own personal investigation, at 10 a.m.

CRITICISM

OF THE

NILE PROJECTS.

Submitted by the Commission of Egyptian Engineers
to the Nile Projects Commission.

1920.

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Application for copies to be made to Abdalla Pasha Wahbi,
Munira, CAIRO.

PREFACE.

The Egyptian Government having appointed a Commission constituted as follows :—

President : Mr. F. St. John Gebbie, C.I.E., Inspector General of Irrigation, India.

Members : Professor H. T. Cory, Consulting Engineer, America.
Doctor G. C. Simpson, Meteorological Reporter to the Government of India.

to examine the Nile Projects proposed by the Adviser to the Ministry of Public Works, a representative body of Egyptian Engineers formed themselves into a Commission to examine these proposals, as they considered them most harmful to their country.

The members of the Egyptian Commission were :—

Abdulla Wahbi Pasha.
Moussa Galib Pasha.
Mahmoud Ismail Bey.
Abdel Kawi Ahmed Effendi.
Ibrahim Zaki Effendi.

These engineers had the collaboration of Dr. Mahgub Sabitt Bey to advise them on the effect of the works from a hygienic point of view, and presented this Report to the Nile Projects Commission on the 26th June 1920.

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CRITICISM OF THE NILE PROJECTS SUBMITTED BY THE COMMISSION OF EGYPTIAN ENGINEERS

TO THE

NILE PROJECTS COMMISSION 1920.

The Ministry of Public Works has proposed certain projects for increasing the water supply necessary for irrigation in Egypt and the Sudan for the purpose of developing new areas for cultivation therein, on condition that no harm should occur to Egypt through the said projects.

As upon such technical projects depends the future of Egypt; it is the duty of every individual who should find any error therein to present his views upon the subject to the public for consideration, and thus avert the occurrence of an evil which, should it actually happen, might prove irremediable. Naturally no one is qualified to undertake such investigations unless he has visited the regions of the Upper Nile, personally examined the observations and calculated the discharges at different points and seasons for the purpose of acquiring an exact knowledge of the correct amounts of these discharges, to be thus able to compare them with those shown in the Ministry's statements, the accuracy of which is disputed by Sir William Willcocks and Kennedy Pasha.

Such a procedure (visiting the regions of the Upper Nile etc.) we, however, have not been able to undertake. For the English officials of the Public Works Ministry continued to work in secret for about twenty years i.e. since 1901, the Egyptian nation remaining meanwhile in profound ignorance of those projects until at last they were suddenly aroused by that astounding outcry resulting from the discussions and disputes which took place in the English Parliament towards the end of 1918 and had for object the refutation of errors in those projects, and which had been occasioned by the criticisms directed by Sir William Willcocks and his colleague to the author of the projects, which would otherwise have remained concealed from the nation. And yet all this did not prevent us from criticising and discussing them.

As, however, there was no available information necessary for such discussion except what we have been able to gather from the Arabic lecture delivered by H. E. Sirry Pasha, former Minister of P. W., to an audience of this Ministry's engineers in December 1919, and the note issued in Arabic by the Adviser, Sir Murdoch MacDonald, entitled " Nile Control Works " and a second Note in English published by him in the beginning of May 1920, and the Sudan Projects, plans and designs exposed in the Ministry's Exhibition Room (opened during March 1920), our present discussion will be confined to the above information, which has been considered as the basis of the said projects, and to such details as we could obtain from irrigation reports of past years, and to the statements of English Authorities, engineers and others. Our sole object is the performance of our duty in the present circumstances, as far as our utmost efforts of investigation, in this short period, could enable us to do.

As is well known, the main points at issue respecting these projects are :—

(1) A determination of the amount of water supply required by Egypt in the flood of 1913-1914, considered by the P. W. M. as the lowest on record, and accordingly, taken as a basis for their calculations.

(2) A determination of the excess water supply expected after the termination of the Nile Works.

(3) Determination of the effect on Egypt of water requirements for the Sudan.

(4) A knowledge of the lowest Nile discharge on record during the whole course of observitions registered by the P. W. M.

As a result of the examination of the notes of the various supporters of the scheme for extracting therefrom the required information, they were found to contain important and flagrant discrepancies, requiring great heed and caution, even in the statements of one and the same person. Owing to the serious importance of such variances and inconsistencies we think it advisable, before anything else, to mention some examples thereof.

FIRST EXAMPLE.

In the Irrigation Report for 1914-1915, Sir Murdoch MacDonald remarks : "The total area of Egyptian lands that will be cultivated when the agricultural development is completed is 7,700,000 feddans (p. 14), after deducting therefrom an area of 200,000 fed. in the region of the lakes in Lower Egypt which will be assigned for pisciculture." In his last note on " Nile Control Works," however, in calculating the total amount of water supply required by Egypt after full agricultural development, he considered the maximum area of cultivation as 7,100,000 (p. 3), or a dieffrence of 600,000 fed. We know of no reason for such a difference ; especially when we bear in mind that the maximum cultivable area in Egypt amounts to 8,067,349, as shown in the book of General Statistics 1918 of the Egyptian Government, No. 68.

We here restrict ourselves to the mere statement of the figures, leaving to the reader's intelligence the conclusion.

SECOND EXAMPLE.

H. E. Sirry Pasha has estimated at 5 milliards the quantity of water which should be discharged annually into the Mediterranean Sea to prevent the rising of the river's bed occasioned by silt deposit (see his Note). Sir M. MacDonald has estimated the same quantity at 3 milliards only (see Nile Control Work, p. 15 1-25).

The difference between the two estimates amounts to more than two milliards. It is well known that one milliard is equal to a thousand millions which is sufficient for the irrigation of 250,000 fed. of cotton, and thus the 2 milliards would suffice to water 500,000 fed. of cotton. And now the question arises: on which of the two estimates are the projects based ?

THIRD EXAMPLE.

H. E. Sirry Pasha has estimated that the height of the water stored in the Lake Albert reservoir will be 6 metres, and the volume of the storage 33 milliards (see his note, p. 6 line 19). But Sir M. MacDonald has disagreed with him in this respect, estimating the height at 7 1/2 metres and the amount of storage at 40 milliards (see Nile Control Works p. 11 line 26).

The difference between the two estimates is so enormous that it cannot be overlooked in such an important scheme. On which of the two estimates, then are the projects based ?

Is it not astounding to the public to find that the difference between the estimates of H. E. Sirry Pasha and those of Sir M. MacDonald respecting one and the same reservoir amounts to 7 milliards? Seven milliards are sufficient to irrigate 1,750,000 fed. of cotton i.e. the total cotton area in both Lower and Upper Egypt as is shown in the official statistics of the Government for 1914, p. 82 which vielded 6,451,000 kantars in such a year; and considering the average price of a kantar to be L.E. 20 we arrive at L.E.130,000,000, which is more than three times the total budget figure of the Egyptian Government for 1920, more than the total amount of the Egyptian Debt.

FOURTH EXAMPLE.

It has been estimated by H. E. Sirry Pasha that the net volume of Gebel Aulia Reservoir will be 3 milliards (see his note p. 5 line 31). This differs from the corresponding estimate for the same given by Sir M. MacDonald, which is, 4 milliards (see Nile Control Works p. 8, 1.13). Which of the two statements should be relied upon ?

FIFTH EXAMPLE.

In the estimate of Sir M. MacDonald, the rice area, which remained uncultivated in 1914 owing to shortage of water supply, was 250,000 fed. (Irrigation Report 1914-1915, p. 18); though, in his note on "Nile Control Works," in the part concerning the calculation of the amount of water supply required in the present time, he estimated the rice area at 180,000 fed. only (p. 7. 1. 2); and in the same note (Nile Control Works, p. 6) he estimated the annual area usually under rice to be 200,000 fed. only. As a matter of fact the area actually planted with rice in 1914-1915 — a year of average flood — was 298,713, as is shown in the General Statistics 1918, p. 68. And now we should like to know which of these various figures is to be taken as the basis for estimates?

SIXTH EXAMPLE.

In the estimate of Sir. M. MacDonald, the deficit in the Nile supply during the summer of 1914 was 3 milliards, see " Irrigation Report," p. 18; but in his Note on "Nile Control Works" that deficit is estimated at 2 milliards only : On which of these two amounts are we to rely ?

SEVENTH EXAMPLE.

When we sought for the amount of water supply actually taken by Egypt in 1913-1914, we found that in the estimate of H. E. Sirry Pasha it was 30 milliards (see his lecture p. 3, line 26); while Sir M. MacDonald estimates is at 31 milliards (see his first note in Arabic, " Nile Control Works, p. 3. Table 1). Nevertheless, in his second note in English on " Nile Control Works," he gave that same amount as 32 milliards. (p. 2. Table 1). On what amount are the estimates to be based?

EIGHTH EXAMPLE.

In order to determine the amount of water supply at present required for Egypt, we have to refer to the estimates of Sirry Pasha and Sir M. MacDonald, which are given in milliards as follows :

IN SIRRY PASHA'S LECTURE	IN NILE CONTROL WORKS (IN ARABIC)	IN NILE CONTROL WORKS (IN ENGLISH).	
30	31	32	Amount of water actually taken by Egypt in 1913-1914.
3	Not estimated.	Not estimated.	Amount of Egypt's water requirements in the 1913 flood for the sharaki lands in the basins of Upper Egypt
Not estimated	2	3	Amount of Egypt's water requirements in summer of 1914, to cover deficiency in rice cultivation, attenuate the rotation crisis and recultivate such portions of the cotton area as have remained fallow.
5	3	Not estimated.	Amount of Nile water that must be allowed to flow to the Med. Sea to prevent the rising of river bed.
38	36	34	

In addition to the apparent discrepancies in the calculations we observe that H. E. Sirry Pasha has omitted to take into account the summer shortage. If the amount of this shortage is added to his estimate from the actual calculations of Sir M. MacDonald, the water supply required for Egypt would, then, amount to 40 milliards. Sir M. MacDonald has neglected to add the amount of flood deficiency of 1913, which was estimated by

Sirry Pasha at 3 milliards for the irrigation of sharaki. He has also omitted in his second estimate the amount of water flowing into the sea. Adding this amount to the calculations of Sir M. MacDonald, it will be seen that Egypt's water requirements would, according to his first estimate, amount to 39 milliards, and, according to his second estimate, to 40 milliards.

It is, thus, obvious from this example that Egypt was in want of all the Nile Supply in 1913-1914, which is considered by the Ministry of Public Works to be the lowest on record, and which amounted to only 41 milliards.

Whose estimate then was taken as a basis for the calculations of the Projects, and on whose statements are we to rely ?

NINTH EXAMPLE.

To find out the future requirements of Egypt, we have referred to the statements of both H. E. Sirry Pasha and the Adviser, wherein we have discovered the following contradictions :—

In his note (p. 4) Sirry Pasha stated that, after the completion of its full agricultural development, Egypt would require 44 milliards; while, in the Adviser's calculations (in his book of Nile Control B.) that amount is given as 50 milliards.

In both estimates consideration is confined to agricultural requirements, regardless of what must be discharged into the Mediterranean Sea, as a precaution against the rising of the river bed.

In his second note ("Nile Control Works"), Sir M. MacDonald has inserted other calculations by Mr. Dudgeon, former Consulting Agriculturalist for the Egyptian Government, Colonel Cooper, Inspector General of the Projects, Mr. Hurst, General Director of the Physical Department, Mr. Molesworth, and his colleague, Mr. Yeni Dunia, drawn up according to their various trials and experiments. These calculations are as follows :—

ESTIMATES FOR THE FUTURE.

Mr. Dudgeon	53 milliards	(See Table p. 32 in Book of Nile Control Works, last one in English).
Mr. Molesworth and Mr. Yenni Dunia	58 ,,	
Mr. Cooper	48 ,,	
Mr. Hurst	51 ,,	

These estimates do not include the amount which must be discharged into the sea as a protective measure against the rise of the river bed and which has been estimated by Sirry Pasha at 5 milliards and by Sir M. MacDonald at 3 milliards.

Accordingly the average figure will be 52 1/2 milliards, assuming the accuracy of their calculations and trials.

Sir M. MacDonald, however, has based his calculations on 50 milliards only, which is below the average; when it would have been more advisable to take as a basis the maximum amount, as a guarantee and protection against danger, which was a better course to adopt from a technical point of view. And this should have been insisted upon, especially as the latter amount is the more worthy of reliance, being offered by two eminent engineers who have co-operated in the experiments and calculations, which leads to the conclusion that their accounts are nearer to the truth and more likely to be exempt from error than those obtained by a single person.

If to this amount is added the 5 milliards necessary for the passage and flow of water down the river for preventing the rise of its bed, then the required quantity would be 63 milliards, or in other words, Egypt would, at the termination of its agricultural development, require the whole of the Nile supply in years of average floods. And thus, by comparing the amount estimated by H. E. the Minister of Public Works, which is 44 milliards, with that given by Sir M. MacDonald, which is 50 milliards, it is obvious that the estimate of the Minister is 6 milliards less, that is to say 2 1/2 times the storage capacity of the present Aswan reservoir.

Between the Minister's estimate and that of Mr. Molesworth there is a difference of 14 milliards — a deficiency equivalent to nearly 6 times the storage capacity of the present Aswan reservoir.

Is it not inferred from such estimates that they have not been based upon exact fundamental and mathematical rules? And has the world ever heard of similar contradictions and inconsistencies respecting such important works, upon which depend the lives of millions of souls, in the calculation of experts treating of one subject, expressing one and the same opinion and agreeing in their insistence upon the execution of the projects, despite the great variance in their calculations and figures ?

And how could the nation be expected to feel satisfied with their opinions and schemes, after such contradictions and inconsistencies ?

It has been declared by H. E. Sirry Pasha, that he was unable to summon the engineers before 1919, owing to the fact that, previous to this, he had been collecting this information upon which the projects are to be based, before taking any step for calling the engineers for the purpose of delivering to them such information.

He also declared that before presenting the projects to the Government and public he must take the opinion of experts, both natives and foreigners, in the country and abroad, to be able to effect the necessary modifications therein. But the Minister soon contradicted himself; for scarcely two months after that sound declaration we read in the Note of Sir M. MacDonald the following observations by H .E. dated 23-3-1920, that is after his second resignation :—

" The projects described on the following pages are those studied by
" the Irrigation Department acting under Sir Murdoch MacDonald, with
" whom I have many times discussed them. We jointly agreed to these
" projects in the form now presented, and I hope that they will in due time
" be approved by the Government and duly carried out."

Is it possible that H. E. the Minister could, in so short a period, manage to expound the projects to native and foreign experts, discuss matters with them and draw from them sufficient agreement and support to make suggestions to the Government regarding their execution ?

The Minister's first and second statements show that the projects have not previously been sanctioned and that nothing official has been decided on. But does this coincide with the official facts of the case ? No ! As a proof we give the following facts :—

(1) In his Note on "Nile Control Works" Sir MacDonald says (p. 8, chapter on White Nile Reservoir, Gebel Aulia), "The construction of this dam has been sanctioned, and the execution of the work actually begun." In the same note, (p. 9, chapter on Sennar Reservoir on the Blue Nile) he says, "The construction of this work is now proceeding, at the expense of the Sudan Government."

(2) In the Irrigation Report 1914-1915, published in 1916, there is the following statement (p. 49) :

"Lord Kitchener and Wingate Pasha visited the site of Makwar "Dam in January, 1914, approved of the general scheme, and decided that "the construction should commence immediately."

In "Nile Control Works" (p. 90) there is the following statement : "The project for the construction of a dam across the White Nile was approved by the Egyptian Government in May 1914."

In the confidential report about Gezira Irrigation Schemes published in Khartoum 1917, note 9, dated 14th May 1917, there is the following statement (p. 1) :

"After several years of study by the Ministry of Public Works' engineers, the Gezira Scheme was approved in January 1914."

As a further proof that the execution of the Sudan Projects has actually been proceeded with since 1914, we quote the following statement from the Irrigation Report for 1915-1916 (p. 29) :

"The digging of the main canal was actually proceeded with towards the end of 1915 at about kilometres 14 from the head." During the same year 1 kilometre and 550 metres of the canal "were dug out at an average depth of 6 metres."

And we now wonder how far the digging has reached at the present moment, that is after the lapse of more than about four years.

What is still more surprising is that in the "Times" of 18th December 1919 and in the "Weekly African World" of 20th December 1919, something was said to the effect that "The Sudan projects have become law, having been passed by the English Parliament both by the House of Commons and the House of Lords." And what Parliament decides no other authority in England can cancel.

We also read in them both that on October 17th 1919 an Agreement was definitely concluded between the Chairman of the Sudan Agricultural Syndicate on the one hand and Sir Edgar Bernard Pasha on the other, whereby the Sudan Government undertook to provide the Syndicate with the land, labour and water required for irrigation.

Did we not entertain doubts about H. E. the Minister's approval of the scheme when it appeared that H. E. and the Adviser's statements disagreed and in view of the official declaration contained in the Report on the incidents ? Was this not evidence that the work was being conducted underhand ?

In order to ascertain the real terms of the Agreement with the Gezira Cotton Plantation Company in regard to the land, area and volume of water that will be taken, we asked H.E. the Prime Minister on May 14th, 1920, for a copy of the said Agreement, but have so far received no reply. The following is a copy of our letter :—

"To H. E. The President of the Council of Ministers.

"As some of my colleagues and myself are examining the great Irri-

“ gation projects with a view to drawing up a report thereon, I have the “ honour to submit to you the following remarks :

“ With reference to paragraph B. of the conditions under considera- “ tion by the Nile Projects Commsision, a copy of an English letter deal- “ ing with a question of considerable importance and which was issued on “ May 8th, 1919 and distributed to the members of the House of Commons “ and House of Lords as well as to the principal British newspapers. The ‘ ‘subject treated is the Gezira Agreement, which had not yet been concluded “ at the time, but which was subsequently signed in London on October “ 17th, 1919, by both the Managing Director of the Sudan Cotton Plantations “ Co. on behalf of the Company and Sir E. Bernard Pasha on behalf of the “ Sudan Government, as mentioned in the weekly paper *The African World* “ in its issue of the 20th December 1919 and in the *Times* of the 18th De- “ cember 1919.

“ This Agreement gives the Sudan Government the right to dispose “ of a considerable volume of water destined for Egypt and the diversion of “ which would lead to complete deficiency in the amount of water required “ in Egypt during the winter and summer seasons in years of low Nile.

“ This Agreement was concluded without the approval of the Egyp- “ tian Government and by so doing the Sudan Government has disposed of “ Egypt’s water, or rather of a part of it, and has given it up to a foreign “ financial company. There is no doubt that if this is allowed to occur now “ there would be nothing to prevent its recurrence in the future whether “ with or without the Egyptian Government’s assent.

“ I therefore hope that Your Excellency will obtain a copy of the “ said Agreement and acquaint the Egyptian nation with it so that it may “ be perfectly aware of the extent to which it has been deprived of its legal “ patrimony, which is the Nile water. It is hardly necessary to emphasize “ the seriousness of the matter in regard to Egypt’s interests, among which “ the water required for irrigation is surely one of the most important.

“ Of all the features of the case, the most striking is the fact that a “ Commission has been appointed to report to the Egyptian Government on “ a question the various formalities of which had been completed through “ the medium of the Sudan Government and with the British Government’s “ approval, without giving the Egyptian Government the opportunity of “ placing a word or interfering in any way in the matter.

I have, etc.
(Signed) : Abdalla Wahby Pasha,
Late Inspector of Irrigation, 2nd. Circle
On his own and his colleagues’ (Egyptian Engineers’) behalf.”

* * *

TERMS OF REFERENCE OF THE NILE PROJECTS COMMISSION.

Attributions of the Projects Commission communicated under cover of a letter addressed to H. E. the Prime Minister to enable him to take cognizance of paragraph B. referred to in that letter.

The Commission is appointed to report to the Egyptian Government its opinion on the projects prepared by the Ministry of Public Works with a view to controlling the Nile water in the Sudan and especially to state its opinion on the following points :—

A The accuracy of the data on which the projects were absed.

B The equitable way to be followed in distributing between Egypt and the Sudan the surplus water obtained by means of these projects.

C The equitable share in the cost of these projects which should be borne by Egypt and the Sudan respectively.

Let us now write down our remarks and criticisms on the project itself, taking as basis the proper declarations of its promoters.

CRITICISM 1.

The Adviser has considered that the cultivated area, in Egypt, from the present time until 1925, will be 5,200,000 fed. See p. 11, Nile Control Book. In 1916-1917 the cultivated area is estimated at about 5,320,000 fed. See p. 12. In 1914 the taxed area in Egypt amounted to 5,633,054 fed. and this area will naturally attain a higher figure in 1925, as shown in the introduction of the " Nile Almanac Book " by Amin Pasha Samy.

The present taxed area in Egypt should, from a technical point of view, be recognised as a basis in calculating the volume of irrigation water required. If we reckon the taxed area in Egypt to be 5,633,054 fed. this volume at present will be, according to the Adviser's calculations :

34.	milliards	c.m.	to irrigate 5,200,000 feddans. (See p. 2.)
3.050	,,	,,	to irrigate the deficit of 4 33,000 fed. in the area calculated by the Adviser, for in his Report he stated that 50 milliards are sufficient to irrigate 7,100,000 fed. (See p. 4 Arabic).
2	,,	,,	of water should be discharged into the Nile during January for navigation (See p. 128. Sir M. MacDonald's Nile Control Note. English copy p. 8.)
3	,,	,,	should be discharged into the sea to prevent the rising of the Nile bed. (See p. 15, Sir M. MacDonald's Nile Control Note, Arabic copy) Sirry Pasha has considered this amount to be 5 milliards.
42.050.			

Thus Egypt is at present in need of the 41 milliards, or the whole water supply of a year like 1913-1914. (See p. 64. Sir M. MacDonald's Report).

We have observed that the Gebel Aulia Reservoir will, on being used, cause a loss of 4 milliards c.m. of water through absorption and evaporation. See p. 49 Sir M. MacDonald's Report. Its construction will not, therefore, be beneficial but detrimental to Egypt if used in a year like 1913-14 during which every drop of Nile water is badly needed. The Adviser has mentioned in his Nile Control Note (p. 8, Arabic copy) the following:—

“If, however, an abnormally low flood, such as that of 1913 should “recur before provision for storage from year to year has been provided at “Lake Albert, it may not be feasible to abstract from the river enough “water to make full use of the Gebel Aulia Reservoir.”

This extract means that water stored in Gebel Aulia Reservoir at that time fails to cover the requirements of Egypt, a thing which should be carefully examined.

CRITICISM 2.

In calculating the amount of water required for Egypt, the Adviser recognised the maximum cultivated area to be 7,100,000 fed., p. 1, but on p. 11 that amount goes up to 7,190,000 and therefore we should, from a technical point of view, say 7,200,000 and not 7,100,000 as has been given by the Adviser when considering the water required by Egypt when the whole area has been reclaimed.

CRITICISM 3.

All tables showing the work of Gebel Aulia and Makwar Reservoir are made up with a view that Egypt's present water requirements are 35.50 milliards. See table 15, p. 66. If we take as correct the Ministry's figures, this amount should be 39 milliards because : —

34. milliards m. c. of water are required for the present cultivated area. p. 2. Nile Control Note, Englich copy.
2. ,, ,, of water should be discharged into the Nile during January for sailing purposes (See p. 128, Nile Control Note, English copy).
3. ,, ,, should be discharged into the sea to prevent the rising of the Nile bed. (See p. 15, Nile Control Note. Arabic copy).

Total 39.

The total is therefore 39 milliards and not 35.50, as stated by the Adviser.

CRITICISM 4.

In our criticism No. 3, we showed that Egypt requires 39 milliards of water according to the Adviser's figures. The Adviser also estimated that Gebel Aulia reservoir will cause a loss of 4 milliards of water through absorption and evaporation (p. 49, Nile Control Note, English copy).

Again he says that Gebel Aulia Reservoir will be constructed merely for the benefit of Egypt and thus Egypt's requirements of water after its construction will be, with the present cultivated area, about 43 milliards, comprising evaporation and absorption losses caused by Gebel Aulia Reservoir. If a year like 1913-14 with a water supply of 41 milliards recurs before the construction of the Upper Nile Reservoirs, how then could we cover the deficiency caused by the Gebel Aulia Reservoir ?

CRITICISM 5.

If we admit the accuracy of the Adviser's figures of p. 7 as regards the present cultivated area and of p. 51 as regards the volume of water required per feddan during the different periods, the water required for irrigation will be as follows :—

AREA IN FEDDANS	WATER REQ. PER FED. CUBIC M.	TOTAL AMOUNT OF WATER REQ.	
3,000,000	7,000	21 milliards	Water required to irrigate Lower Egypt.
1,000,000	8,600	8.60 ,,	Water required to irrigate Upper Egypt under the Sefi system.
1,200,000	7,600	9.12 ,,	Water required to irrigate the area in Upper Egypt under Basin system.
5,200,000		38.72 ,,	

or 39 milliards of water instead of the 34 milliards given by the Adviser, if we consider his figures regarding the area and the volume of water required per fed. to be accurate.

Again, if we add the 5 milliards c.m. which, according to the Adviser, should be lost into the sea and into the Nile for navigation, the total volume of Egypt's requirements of water under the present cultivated area will be 44 milliards and not 35.50 as is given by the Adviser.

CRITICISM 6.

After construction of Gebel Aulia and Makwar reservoirs and before 1930, the Sudan and Egypt's requirements of water will be, according to the Adviser's figures, as follows :—

34	milliards	required to irrigate the present cultivated area. (See p. 2, Nile Control Note, English copy).
2	,,	must be discharged into the Nile for navigation (p. 128 Nile Control Note, English copy).
3	,,	must be discharged into the sea to prevent the rising of the Nile bed. (p. 15, Arabic copy).
3.150	,,	are lost by evaporation and absorption through the construction of Gebel Aulia Reservoir (p. 49 Aswan gauge).
1,600	,,	required to irrigate the 300,000 feddans in the Gezira (pp. 87-88).
43.750		

The total is about 44 milliards and this amount will not be in a year like 1913, the supply of which is 41 milliards only (p. 3. Table 1. Nile Control Note. Arabic copy). The whole Nile water supply in a year like 1913-14 will not, therefore, suffice Egypt alone assuming the Gebel Aulia reservoir to be already constructed. Ref. criticism No. 5.

CRITICISM 7.

The Ministry has, through H. E. Ismail Pasha Sirry, then the Minister, said that the Nile discharges in 1913-14 were about 41 milliards, of which 11 milliards flowed uselessly into the sea. (Ref. to Sirry Pasha's Lecture). Sir M. MacDonald, on the other hand, estimates the wasted amount to be 9 milliards only (p. 2.) and no mathematical account was made in either case to show the amount discharged into the sea during 1913-14. One member of our committee has asked the Ministry for information concerning these facts in order to be able to know the actual amount of water required for irrigation and the amount discharged into the sea, but the Ministry gave no answer despite the extreme importance of such information.

They say that the real object of these projects is simply to store the surplus amount of flood water for summer use when the Nile supply happens to be too short to cover irrigation. Reservoirs fail to do this as regards Egypt because after their construction the lost amount of water will be as follows:—

3.150	milliards	of water are lost by evaporation and absorption in Gebel Aulia reservoir (p. 49). (This is calculated at Aswan).
3	,,	should be discharged into the sea to prevent the rising of the Nile bed. (p. 5 Arabic copy). This amount is considered by Sirry Pasha to be 5 milliards.
2	,,	should be discharged into the Nile during January for navigation (p. 128).
1.600	,,	will be taken for the Sudan irrigation purposes (pp. 87-88).
9.750	TOTAL.	

That is to say, a volume of 10 milliards of water will be lost from the Nile, no benefit recurring to Egypt therefrom.

Before the construction of these two dams this amount passed on to Egypt during the flood season and this helped to make navigation easy. After the construction of these two dams 10 milliards will be lost uselessly; of these 8 1/2 milliards are wasted and two milliards are taken merely for the Sudan irrigation. Three milliards only of this amount will pass on to Egypt during the flood season and this is not sufficient to prevent the silt from being deposited in the river bed, a thing which will cause great damage.

CRITICISM 8.

The cultivated lands of Egypt are irrigated in two ways :—

(1) The Perennial Irrigation System depends largely upon the amount of Nile water supply.

(2) The Basin Irrigation System depends largely upon the Nile water levels. If the water level is high less danger is expected to occur and little or no lands will suffer from sharaki.

The construction of Gebel Aulia reservoir which, from August to October, stores all White Nile waters in a year like 1913-14 (p. 50), and the fact that some of the Blue Nile water is drawn during this time to irrigate Gezira lands and to fill up Makwar reservoir (p. 89) will affect the Nile water in years like 1899-1900, 1913-14. It would have been better for the Adviser to have drawn up tables to show the water levels in observation stations along the Nile bed from Aswan to the Mediterranean Sea from the beginning of August till the end of October and for periods of ten days for years like 1899-1900, 1913-14, and assuming that Makwar and Gebel Aulia reservoirs as well as Nagh Hamadi barrage are all built, in order that the effects of these projects be felt by all, and especially as regards the irrigation of Egypt and the particular Basin irrigation system.

Being anxious to obtain more information on this point, we submitted (May 14th, 1920) a letter to H.E. Moh. Shafic Pasha, the Minister of P.W., with a list containing some queries. On the same date we also sent another letter as follows :—

"H. E. The Minister of Public Works.

"Sir,

"On page 25 of the Adviser's Nile Control Book, English copy, which appeared on May 1st, Mr. Cooper stated that any canal will lose 30 % of its water from the heard to the distributary branch. He also added that the losses will increase in the distributary itself. The above figure was altered into 25 % for the losses in Upper Egypt.

"I should, therefore, be much obliged if you will kindly send us a true copy of each of the reports of Mr. Cooper, Mr. Molesworth and Mr. Yennidonia, concerning the amount of water required for irrigation in Egypt."

On May 16th, we received the following reply :

"H. E. Abdalla Pasha Wahbi.

"In reply to your letter dated 14th inst., I have the honour to inform you that the Ministry considers that what has already been published by the Government on the Sudan Projects is quite sufficient for anyone to study this question.

"In case you desire more information you can send your request direct to the Nile Projects Commission, which, on realising its importance, will ask the Ministry to accede to it."

From the above letter it may be concluded that the Ministry fears to divulge the details we were applying for. We then wrote to the Commission, as suggested, but have so far obtained no reply.

CRITICISM 9.

The ultimate object of these schemes is to appropriate the Blue Nile exclusively to the irrigation of the Sudan and the White Nile for the benefit of Egypt. This appropriation will be most prejudicial to Egypt, if it will not lead to total ruin, as it will deprive the lands of the Blue Nile's red silt which carries with it the fertilizing substances.

In support of this statement, namely, that the Blue Nile water will be devoted to the Sudan and the White Nile water to Egypt, we would quote here the opinion of great British engineers and Rulers on the matter.

1. Sir William Garstin, formerly Adviser to the Ministry of Public Works for several years, was the first to study minutely these projects and personally to take observations and Nile discharges from its source down to Khartoum, a work for which he was awarded a sum of L.E. 15,000 granted by the Egyptian Government in compensation for the hardships he sustain-

ed while in Abyssinia. He wrote a book on these works which he translated into Arabic and called "The Sources of the Upper Nile."

The following lines are extracted textually from this book (p. 183) :

" The opinion has already been given in these pages that any works undertaken upon the Blue Nile should be designed and carried out in the interests of the Sudan rather than of Egypt — the latter country deriving its increased discharge from the waters of the White Nile.

" There can be no question that by far the best and most certain method of increasing the Blue Nile supply, during the months prior to the annual rise, would be by the construction of regulating works at the outlet of the river from the Tsana Lake, using the latter as a storage reservoir, under effective control."

Page 172. Treating of the projects to be carried out in order to increase the summer supply in Egypt and to provide for the water necessary to the Sudan, he says :

" The best way in which to secure the results aimed at would appear to be, to reserve the waters of the Blue Nile for the improvements of the countries bordering that river, while Egypt and the area of the Nile valley lying to the North of Khartoum shall derive their summer supply from the sister river."

Page 188. " Each of the projects for the Eastern Sudan, as described in the following pages, relates to Sefi or summer irrigation alone. Should it be found, upon fuller and further study, that, either on account of expense, or the impossibility of increasing the Blue Nile water supply, they have to be postponed, or abandoned, there still remains the other method of adding to the productive wealth of these areas, to which the objection of an insufficient water supply does not apply. This method is the introduction of flood and winter irrigation, for the cultivation of cereals and other winter crops."

Page 190. "The best and most complete project in connection with the Blue Nile is, beyond all question, that of constructing a regulator at the outlet of the river, at Lake Tsana, whereby the lake may be converted into a storage reservoir of large size."

Briefly speaking, Sir William Garstin's statements might be summarized in the following words : —

For the reasons set forth he does not agree to the construction of a reservoir or to the erection of a dam or sudd for the storage of water in the river.

Nor does he agree to summer cultivation in the Sudan Gezira *until after the construction of Lake Tsana reservoir.*

In the event of the increase of the Blue Nile water being impossible, any project providing for summer watering in the Sudan should be set aside, and replaced by a system of annual flood irrigation for the cultivation of cereals and winter crops.

In the Blue Book on Egypt and the Sudan for the year 1905, Lord Cromer says on page 49 :—

" Sir William Garstin's irrigation projects were based broadly on the idea that the waters of the White Nile could be employed for the benefit of Egypt, and those of the Blue Nile for the benefit of the Sudan."

The 1914-15 Irrigation Report (p. 49) reads as follows :—

" The damming of the White Nile, unlike the work in progress on the Blue Nile, is one of the undertakings which are to control the Upper Nile for the benefit of Egypt, the Blue Nile weir will chiefly benefit the Sudan."

In "Nile Control," Part 6, Sir Murdoch MacDonald says :—

"Wheress Egypt can provide for its own needs from the White Nile, it is only water flowing in the Blue Nile that can be of use to the Sudan Gezira."

He further says in "Nile Control" (p. 76) :

"The Upper Blue Nile dam need not be considered as regards Egypt, for the water it stores will be completely utilized by the Sudan, though in the intermediate stages, before all the above works are completed, there may be certain periods when water from this dam will be used by Egypt, if a very low year should recur during one of the periods referred to."

In Nile Control (p. 14) Sir Murdoch MacDonald says :—

"The total area of the Sudan Gezira that can be commanded by the Sennar dam is about 3,000,000 feddans."

The volume of water required for this area was estimated by Sir M. MacDonald at 18 milliards. If we bear in mind that in a year like 1913-14 the Blue Nile discharge at Sennar does not exceed 21 milliards, it will be easy to understand the reason for reserving only 3 million feddans of the Gezira lands to be irrigated by the Blue Nile, the Blue Nile supply in a year like 1913-14 being insufficient to irrigate a larger area.

In his letter to the present Minister of Public Works, dated April 20th, 1920, serving as an introduction to his last Note in English, Sir M. MacDonald says that the proposed Sudan irrigation projects are taken from the projects of Sir William Garstin, former Adviser to the Ministry of Public Works, with some modifications of order. It is to be noted, however, that he took them in a reversed order and for a purpose contrary to Sir William Garstin's intention, as the latter insisted on the construction of Tsana Reservoir before building a dam like that of Sennar.

But Sir M. MacDonald started with the Sennar Dam before providing for the Tsana Reservoir or for any other reservoir on the Upper Blue Nile, with the result that this change in order will cause Egypt, in regard to its irrigation, all the harm that Sir William Garstin endeavoured to avoid, as may be seen from his declarations to the effect that no dam should be constructed on the Blue Nile and no work of any kind should be undertaken for the Sefi Irrigation in Gezira until the Lake Tsana Reservoir had been built.

The above shows clearly that it is intended to reserve gradually the whole of the Blue Nile water for the irrigation of the Sudan lands either in the Gezira or on the eastern bank which covers an area of 5 million feddans, 3 million of which, situated in the Gezira, are said to be quite fit for cotton cultivation, as proved by experience. This is a matter the realisation of which is not impossible, seeing that perennial irrigation will be of great assistance in attaining the object in view. This is expected to occur gradually, to the great detriment of Egypt.

Let us examine now the need of Egypt for the Blue Nile water.

THE BLUE NILE AND ITS INDISPENSABLENESS IN REGARD TO EGYPT.

There can be no doubt that in the old as well as in modern times, the Nile Valley owed its formation to the silt carried by the Blue Nile from the Upper Nile and Abyssinian regions down to Egypt, as the White Nile water is white and clear, whereas the Blue Nile water is red and has formed the soil of Egypt and has ever been the source of its fertility. Anyone who refuses to acknowledge the necessity of the Blue Nile water denies the truth. The following shows the advantages arising from it.

The Blue Nile flood comes rapidly and at an early date every year, carrying a considerable amount of water, while the White Nile flood is on the contrary slow in its early stages. The advantages of an early flood are :-

(1) To relieve the critical period of summer rotation and sometimes to cause their total suppression, as has happened in several years. The Ministry itself supported this view in the circular communicated to the Press last April, when complaints were sent in from all quarters owing to the shortage of the water supply at the commencement of the cotton cultivation season. In that circular it was said that there was no hope of increasing the water supply unless the rains fell early in Abyssinia.

(2) Early irrigation of the sharaqui — which lands are devoted to the cultivation of maize, the staple food of 80 % of the entire population of Egypt. The early cultivation of this crop always augments its product.

(3) The natural fertilisation of the land by the silt carried by the Blue Nile water, which is uniformly distributed all over the fields without the least expenditure. It is needless to point out the advantages of this fertilizing matter.

The exclusive utilisation of the Blue Nile waters for the irrigation of the Sudan would deprive Egypt of this valuable silt, in virtue of which Herodotus has described Egypt as "The gift of the Nile."

The various advantages which accrue to Egypt through the existence of the silt in the irrigation water are indeed a matter of common knowledge. But such is the importance of the question that we feel bound to quote here some passages on the subject from Sir W. Willcocks' " Egyptian Irrigation" (p. 750, Part 11, 3rd edition) :

" From the very earliest times Egypt has been described in the Sacred Books as God's Paradise. The Romans also used to call it The Paradise of the other world."

Egypt owes these glorious epithets to that rare power which its lands acquire from the silt-laden waters of the Nile. Owing, however, to the recent tendency to undervalue the beneficent effects of the Nile silt and to attribute the fertility of Egypt's soil to the ample supply of irrigation water only; it is desirable to bring to the fore the following facts :—

(1) It is a matter of common knowledge that the fertility of agricultural land increases with the height of the silt deposit with which it is covered. It is stated by Dr. Hume that" the volcanic matter which forms the substance of the Nile silt is among the most fertile earth matters in the world." The chief object aimed at by the late Colonel Ross in the Irrigation Works of Upper Egypt was to avoid any obstacle which might impede the free flow of the silt-laden water to all the fields.

(2) One of the reasons for the improvement of the rent of basin lands is the plentiful supply they receive of silt-laden water.

(3) H. Naus, the Directing Manager of the Sugar Company, has stated (in para. 120 on the Sugar Cane) that the silt-laden water has the same effect as a fertiliser when it covers the fields.

(4) In his book on Egyptian Agriculture, p. 28, M. Linton states

that from the rocks of Egypt nothing can be obtained but a valueless clay lime. As to the precious Nile silt it is brought from rocks situated far away in the south. At p. 45 he says " The Nile water is the sole fertilising factor for the agricultural lands of Egypt. The silt which the Nile water contains is of immense value for the sandy soil of Egypt. As for the water drawn from wells, it is naturally free from all extraneous matter, and is therefore of little value to the land."

(5) The whole of Chapter 11. of Mr. G. B. Foaden's book on Egyptian Agriculture is full of incidents and facts testifying to the fertilising property of the Nile silt. The superfluity of its object matter prevents us from reproducing it here in full, but we quote the few following passages selected at random :—

(a) Every increase in the amount of water for irrigation is of no advantage unless it is accompanied by a corresponding increase of manure. p. 213.

(b) If the soil is fertilised by the silt alone, irrigation water would be quite sufficient without the aid of any manure. p. 314.

(c) The Nile silt may be roughly considered as a manure which has aided more than anything else in the fertilisation of Egypt's soil. While the red water covers the basins it deposits on the land a layer of valuable silt, and thus the fertility of the soil is annually increased. We have already referred to the fact that when the lands of Lower Egypt used to be irrigated on the basin system there was no such need for manure as we witness to-day. p. 225.

(d) Calculated on the basis of the price of commercial manures, the value of the silt deposited annually per feddan would therefore be L.E. 1.50 (one and a half pounds). p. 229.

This was written in 1913. How much would it cost now when the prices of manures have reached four times their former value ?

(6) Considering the importance of the silt, Mr. Lang Anderson has suggested, in his book, the alternate system of basin and perennial irrigation. " By this method the fertility of the soil may be preserved year after year by the introduction of the valuable Nile silt."

(7) If proof were needed to convince the reader of the truth of these statements, he might compare the rich alluvial lands of the Sudan, irrigated by the silt-laden Blue Nile waters, with the poor lands irrigated by the White Nile waters.

(8) " The superiority of the Nile over other rivers consists in the red silt carried by the water during the flood season every year." (Encyclopædia Britannica, 11th edition, Volume 11, p. 847.

(9) In his book on Irrigation (p. 225) Sir Hanbury Brown says : " In order to preserve the fertility of the soil, it must be annually overflooded by the silt-laden waters, which should remain over it until they have deposited their silt."

We, therefore, object to the construction over the Blue Nile of any engineering work which may deprive Egypt of the silt-laden waters so necessary for the fertilisation of its soil. Indeed it is only owing to the fertilising power of this silt that we hope to effectively reclaim the northern part of the Delta which is now lying fallow and which covers an area of about 1,900,000 feddans. It is a well known fact that the soil of this land in either salty or sandy and in both cases it needs this rich alluvial silt.

It may be noted also that the exclusive use of the Blue Nile waters for the Sudan and the construction of dams over this river will not only deprive Egypt of the rich silt but also of high floods, which occur from time to time and overflood the high sandy islands and bermes, so that the silt is deposited upon them, giving them a renewed fertility, without which they would have remained useless for cultivation.

With regard to the dangers of high floods, it may be mentioned that no such fears should now be entertained after the Government has expended such considerable sums upon the heightening and strengthening of the banks of the Nile. Since 1892 all protective measures have been taken and not the least danger from this quarter ought to be feared at present.

CRITICISM 10.

The experiments made to ascertain the ultimate water requirements of Egypt and the Sudan show that, according to the estimate of Messrs. Molesworth and Yenidunia, Egypt will require 58,000 millions (as shown in example 9). If we add 2,000 millions for navigation (p. 128), 3,000 millions, the inevitable loss to the sea during the flood (p. 15, Arabic copy of Note on Nile Control Works) and 6,000 millions required by the Sudan (p. 128), the total would be 69,000 millions, and not 56 millions, which is considered by the Adviser as representing the ultimate water requirements of Egypt and the Sudan after 1955 (p. 128). This is admitted on the assumption that the total area of cultivation in Egypt shall not eventually exceed 7,100,000 feddans.

CRITICISM 11.

On p. 127 it is stated that the reason for selecting Lake Albert as the most suitable site for constructing the reservoir is that it has steep sides, and therefore there will be no great increase in the area of water surface as the level rises; consequently there will be no additional evaporation loss of any importance due to this cause. This is all very good and quite reasonable, only it remains to be provel that the lake is really as described above.

According to this the Gebel el Aulia is one of the worst sites for a reservoir, as it would increase the surface of evaporation, causing the loss of 4 milliards c.m. of water.

CRITICISM 12.

No detained estimates have been prepared for the expenses of the Projects. It has always been observed that the final cost of such works undertaken by the M. P. W. attains in most cases double the amount provisionally fixed. Detailed estimates are necessary, so that, after due checking and verification, a comparison can be made between the necessary expenses and the advantage to be obtained from the projects.

CRITICISM 13.

The projects provide for the cultivation of cotton on about 3,000,000 fed. of the Sudan Gezira. Considering the amount of irrigation water required for this area as 18,000 millions, according to their estimate, the drainage water which will then pass on from this area to the White Nile will be about one third the above-mentioned quantity.

Therefore, as a result of the proposed projects, the Nile water which flows to Egypt will consist of seepage and drainage water — a fact which should raise the greatest anxiety, as it will deeply affect the health of the inhabitants as well as the fertility of the cultivated lands. Indeed we fail to understand how the drainage water will be allowed to be used for irrigation purposes, while now it is strictly prohibited to do so and the Irrigation Department forbids anyone under pain of penalty to mix the drainage water with the irrigation water. Article 33 Canals and Banks law.

CRITICISM 14.

The allegation made by the Adviser that all the calculations of the Ministry of Public Works prior to 1912 were erroneous and that they all tended to undervalue the Nile discharge is liable to dispute. The work alluded to was undertaken by English officials and it is a matter of common knowledge among the native engineers that the high English officials of the Ministry before 1912 were very strict and exact in determining river measurements and discharges. Indeed it seems that the attention of the Adviser was only drawn to the above-mentioned errors when he wished to have the Projects carried into execution.

CRITICISM 15.

The Egyptian engineers are of opinion that it is against the public weal to construct the Gebel Aulia dam on the proposed site where it will form a pool of stagnant water, the length of which will be about 800 kilometres, as is shown by the maps, in the neighbourhood of inhabited towns. Of course this will lead to the increase of mosquitoes and the spread of fevers. It will also overflood expensive cultivated lands, the inhabitants of which will be disturbed and obliged to seek home and bread elsewhere. In fact they will be compelled to migrate to the Gezira and work there as slaves. The mischief thus caused will be the more clearly brought to light when we remember that there is no reason to consider the site in question as the only suitable one, especially when we bear in mind that in a year like 1899-1900 or 1913-1914, when Egypt will be in sore need of every drop of water, the amount of evaporation and other losses in the Gebel Aulia Reservoir will be about 4,000 million cubic metres.

Again the expenses to be incurred in the construction of this dam are destined to be considered as a lost sum, since it is only a provisional work until the completion of Lake Albert dam. Not only this, but also the sum of L.E. 300,000 to be paid by way of compensation to the inhabitants of the flooded area. Thus the total loss will amount to L.E. 2,200,000.

CRITICISM 16.

The Adviser states that up to 1930 the maximum area to be irrigated in the Sudan is 300,000 feddans of which not more than 100,000 of cotton will require water after 19th January. The rest will remain fallow until July 15. On this basis, the Adviser has made his calculations (table, page 67) regarding the method of working Gebel Aulia dam and the amount of water which will reach Egypt. The truth, however, is that the Sudan areas which will be drawing water at that time will be as follows: 300,000 feddans in the Gezira, for which the Makwar Dam is constructed at present (page 67) and of which only 100,000 will draw water from the Makwar Reservoir after Jan. 19th, without affecting the supply of the Blue Nile in that period, which supply will entirely flow to Egypt, as they say.

The Adviser has omitted, however, the quantity of water required for the one hundred thousand feddans at present under cultivation in the Sudan — 20,000 of which are under summer cultivation and 80,000 under winter cultivation on the basin system (page 4). This quantity should have been taken into consideration.

* * *

THE STORAGE, DRAINAGE AND SEEPAGE WATERS OF THE UPPER NILE SCHEMES AND THE HARM THEY CAN DO, EXAMINED FROM THE AGRICULTURAL POINT OF VIEW.

The question of Storage, Drainage and Seepage water is a vital one and deserves full consideration, as the harm which can be done by such waters, if the irrigation schemes are carried out, is very great.

The drainage waters of the irrigated lands of the Gezira will flow as a matter of course into the White Nile. This is due to the fact that the Blue Nile flows at a higher level than the White Nile and that the Gezira land itself slopes towards the White Nile.

This slope is 25 metres along 130 k.m. between Lats. 14 and 15 N. or 19 c.m. per k.m., which is a very great slope, bearing in mind that the greatest slope in Egypt is 10 c.m. per 1 k.m.

The level of water upsteam of the Sennar Reservoir is 420.70 whereas the level of the water upstream of the Gebel el Aulia is 380.50 giving us a difference in level of about 40 metres. This great difference in level makes the water flow perpetually from the Gezira after depositing all its silt and getting rid of its natural fertility. Nay it will carry with it a large quantity of injurious salts of various kinds.

It is clear from Sir Murdoch MacDonald's notes that the waters of the various reservoirs will be utilised for the irrigation of Egypt and the Sudan, and as the White Nile is the natural drain for the water used for irrigation in the Sudan the natural conclusion is that the water will come to Egypt deprived of its silt and completely changed from what it originally was. This is one of the greatest dangers threatening the welfare of Egypt in future.

It is reported that Sirry Pasha once said that there was no need to consider the drainage of the Gezira because, the level of the Gezira being naturally high, there was no need for any drainage system. The land of the Gezira, he says, will absorb all the surplus water. It seems that Sirry Pasha has forgotten that in course of time, and as a result of the perpetual cultivation and irrigation, land, which though generally free of salt at the surface, contains considerable quantities at a metre below the surface, will need thorough drainage. The great height of the Sennar Reservoir and the perennial irrigation of the Gezira lands will make this inevitable.

Thus it is obvious that sooner or later drains will have to be made to preserve the fertility of the land.

These drains will all flow into the White Nile which will naturally become a general drain for them all.

To it will flow all the drainage and seepage water coming from all the agricultural lands on the White Nile whether they are under perennial or basin irrigation, between the two levels 378.50 and 380 on both banks of the river.

In spite of the fact that Sirry Pasha says there is no need for drains, we see the alignments of these drains marked on the map of the Gezira, proving that it is the determination of the authorities to construct them. The drainage of the Gezira will be temporarily confined to the area near Wad Medani but it will extend to 3 million feddans, the whole of whose drainage and seepage water, or one third the irrigation water, will flow into the White Nile.

This water will indeed be detrimental to Egypt as a whole and especially to Lower Egypt whose irrigation water will in the future be derived from that water the source of which we have explained and to which will be added the drainage water of Upper Egypt resulting from the land which has been or will be converted into perennial irrigation, amounting as a whole to two and a half million feddans.

* * *

THE EFFECT OF THE DAM FROM A HYGIENIC POINT OF VIEW.

With a view to fully investigating this point we requested Dr. Mahgoub Sabitt. B. Sc. Med., M. D. (Genéva), Diploma of Tropical Medicine (Paris), formerly Assistant Professor of Pathology and Bacteriology in the School of Medicine, Kasr el Aini, Medical Expert, Native Court of Appeal, Professor of Medical Juridisprudence and Toxicology at the Egyptian University, and he gave us the following explanations.

The great French engineer Chélu Bey(1), formerly Chief Engineer in the Egyptian Sudan, and a member of the Civil Engineering Society of France, in his book " The Nile, the Sudan, and Egypt," published in Paris in 1891 (pages 19 and 25) said " that the water of the White Nile changes colour three times.

" Between March and April during a period of 20-25 days the water is green and this is accounted for by the fact that the water comes from the marshy zone which is saturated to a great extent with vegetable matter. This water retains its green colour throughout the season, during its passage to Egypt.

" It is very injurious to health, and the inhabitants of those banks avoid drinking it while in this condition. Subsequently the green colour gives place to a new colour tinged with a reddish hue, which however remains only for a short time. Long before the low stage period it is changed into a semi-clear tint, sea green, i.e., light blue colour, whence it has been called White Nile." Hygienic rules establish the fact that green coloured water is unfit for drinking purposes as it contains organic matter undergoing a continuous process of conversion and decomposition.

The Sudd zone of the Nile is full of organic matter, both animal and vegetable.

From a chemical analysis of the White Nile water made on samples taken from Omdurman in March 1877 and from Fashoda in May of the same year, that is to say, at the end of low Nile and the beginning of flood season, immediately before the rainfall in these regions, we give below the table from the book above mentioned, page 19, adding to it the analysis of the water of the Blue Nile near Khartoum, page 25 of the same book, for comparison.

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(1) Chélu Pasha, who retired from the service of the Egyptian Government ten years ago. He reprinted his book in Paris in 1910.

ANALYSIS OF NILE WATER.

NATURE OF SUBSTANCES	SAMPLES FROM THE WHITE NILE		SAMPLES FROM THE BLUE NILE	
	FROM OMDURMAN MARCH 1877	FROM FASHODA MAY 1877	FROM KHARTOUM AT THE WORKSHOPS 3. 2. 1877.	FROM KHARTOUM AT THE WORKSHOPS 15. 8. 1877.
(A) Substances in suspension :				
Organic substances	.5402	3.3150	.2086	2.3419
Mineral substances	.6390	.7460	1.3543	14.3922
	1.1792	1.0610	1.5629	16.7341
(B) Soluble substances per cent :				
Lime	.1126	.1764	.5585	.6853
Magnesia	.0759	.0274	.1414	.1729
(C) Caustic Soda	.0287	.1308	.0525	.0785
Potassium Nitrate	.2174	.3645	.3007	.4070
Ammonia of organic Substances	.0016	.0023	.0017	.0020
Sulphuric Acid	.2931	.3138	.3941	.3118
Carbonic Acid	.8228	1.4870	.4823	.5212
Nitric Acid. (Free)	traces	traces	traces	traces
Silicates	....	....	.0832	.1433
TOTAL	1.6061	2.5022	2.0144	2.3220

This table shows that the quantity of nitrates in the form of potassium nitrates is in excess. Although it indicates complete organic fermentation and the force of ground filtrations nevertheless it renders the water unhealthy and unfit for drinking purposes.

When organic animal substances are the source of such nitrates (*vide* page 65 of " Précis d'hygiène," by Macaigne, printed in Paris 1911) as in the case of the White Nile, which carries numerous dead plants and animals which live in those regions and die in their waters.

It is hygienically admitted that the existence of ammonia means that the water is polluted by organic animal substances such as town drainage waters, faeces, excrements of animals, etc, and that it is sufficient for any water to contain from one to two milligrammes of ammonia per litre to render it questionable for drinking purposes. (*vide* above-mentioned "Précis d'hygiène" p. 63).

In the case of the organic substances being of animal nature not more than one milligramme per litre can be allowed.

It is clear from the chemical analysis of the White Nile water shown in the previous table, that the Nile water at Fashoda contained 0.0023 of ammonia while at Omdurman it contained .0016. This partial decrease of the ammonia resulting from the decomposition of organic substances is caused to some extent by the confluence of the two rivers, and it is still a large enough proportion to make the water undrinkable.

The previous table in connection with the White Nile shows the existence of carbonic acid in excess in the White Nile caused by the decomposition of vegetable substances(1) obstructing the bed of the Nile, and by the decomposition also of enormous numbers of animals which live and die in this huge basin, that is, the Sudd zone at the 9th degree of latitude. Mr. Chélu says in his above-mentioned book (page 15) :

" The water of the White Nile in this zone and the rest of its course up to Khartoum loses its clearness and becomes charged with a bad smell by reason of its being heavily saturated with the organic matters decomposed therein and is never good for drinking. It is nothing but "purgative water" which flows from those regions carrying microbes and parasites of infectious diseases which can only live in water saturated with decomposed organic matter, such as the microbes of malaria, which is brought about by mosquitoes that exist in abundance in those districts, dysentry, poisonous flies, different species of aquious worms such as Bilharzia and Fileria Medinensis, other kinds of Fileria worms and microbes which cause what is called "Nile sores" and other fatal diseases resulting from microbes germinated in those regions such as the sleeping disease and the black-water fever.

During the month of October, about the end of the rainy season, the vegetable matter exposed to the sun undergoes fermentation and decomposition. The air of that zone in fact becomes saturated with the malaria and other injurious and even deadly microbes. This was noticed by Mr. Chélu and other investigators during their researches in those districts.

The water reaches its worst condition during the period between March and April. What would become of Egypt should it be deprived of the water of the Blue Nile, that pure and clean water, with its rich, fertile and precious silt, that water which surpasses in purity that of the slowly running White Nile whose water is mixed with the residues of impure organic matter. If Egypt is deprived of the water of the Blue Nile, its drinking water will be nothing but stagnant and poisonous water, the water of the Sudd zone, water which is even refused by tribes living for centuries on the banks of the river and which is kept in the marshy region at Lat. 9 (1). If we add to this the fact that the water of the White Nile, after being stored for a year in the Albert Nyanza lake and stopped in the swamps at Lat. 9, i.e., the Sudd zone, and after depositing whatever silty matter is brought to it by the river Sobat, leaves this zone and enters the White Nile proper which has only a very slight slope, it does not continue long in this slow course, but after a short course it enters the Gebel el Awlia Reservoir whose length is 800 km. and width 25 kil. that is to say, a huge lake where the water is being stored from previous years covered with layers of all kinds of living organisms and mosquitoes which carry the microbe of malaria and all kinds of fileria and other microbes of fevers. It is not possible to understand how to fight these huge swarms of mosquitoes, and how much petrol would be required to cover the surface of this huge lake whose area is about 1,500,000 feddans (6400 square kilo), this being the surest way for destroying, and what finance can stand this huge expense ? (2)

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(1) The most important of which is a kind of tree which Dr. Schweinfurth, the German explorer, and a well known expert in botany, called "Ambach " or "Herminera Elaphroxilon." The height of these trees varies from 5 to 6 metres with a diameter which varies from 18 to 22 centimetres. Their roots extend in water while their branches grow above the surface of water. The wood of these trees is composed of light fibres which are easily carried away by waves and winds, and consequently, together with other reeds and water plants, especially the papyrus reeds, the height of which is from 5 to 6 metres, go to form the Sudds.

It must be remembered that at Aswan, it is the top two or three layers, especially the uppermost layer, which becomes green and offensive and unwholesome. The lower water is much less affected. As the Aswan reservoir is narrow and deep, it results that only a small part of the water of the Reservoir is very bad. In a broad shallow lake like the proposed Gebel Awlia reservoir, the greater part of the water will be very bad and unwholesome.

It is for this reason moreover that the deepening of the water in the Aswan reservoir, by increasing the height of the dam, will not only not increase proportionally the bad quality of the stored water, poor in oxygen, but will decrease it.

It is difficult to conceive what has been stated in the Arabic translation of the report of the London committee appointed in 1919, to investigate the Nile Projects, that although it is undeniable that if the water of the ponds were left stagnant there would be an increase of mosquitoes, still it would be possible to prevent this by taking the necessary measures bearing in mind that the nearest point of the reservoir will be about 25 miles from Khartoum.

We can see no surer measures but those we have already mentioned for the destruction of those mosquitoes. Moreover have not the measures which were taken since the conquest of the Sudan in 1898 proved to be futile? It is a fact that the prevalence of malarial fever in all its different forms, acute and otherwise, is not confined to the Sudd regions, the swamps of Bahr el Gazal and Sobat only, but comprises many parts of the Sudan, as can be shown by the continuous complaints coming from those living there whether Sudanese or Egyptian Officials.

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(1) It is well known that the inhabitants of Omdurman drink Blue Nile water although they are nearer to the White Nile, and that other localities situated on the same river drink from wells. It is also known that the Taashi, the Caliph, and the Mahdi used to punish offenders by committing them to drink White Nile water.

(2) See page 16, line 32 of Sir Murdoch MacDonald's Report in which he says "and this quantity cannot be obtained except from previously stored water." And see line 15, 16, and 17, "It is evident that the quantity of water required cannot be obtained from the future flood but from stored up water of a previous flood." See also Lecture of the Minister of Public Works Page 7 lines 5 and 6.

Many lives were victims of the deadly fevers. The only cause of all the trouble is the existence of those swamps formed by the branches of the White Nile and those lakes which are natural reservoirs. The reservoirs proposed in the Nile projects are nothing but artificial lakes intended to store water. It would be impossible to discharge all the water from some of them every year and consequently water would remain there stagnant for years. It is inconceivable how the committee of London appointed in 1918 for the investigation of the Nile projects could depend on a single opinion given in 1911 by Dr. Andrew Balfour, formerly director of the Sudan Health Department, taking his opinion as that of an indisputable authority on questions of this nature, and asserting that "he does not expect any particular danger to threaten public health as a result of building that reservoir." (page 9, Nile Projects, line 48, Arabic Trans.), while in the English copy Dr. Balfour is quoted to have said: "So far as Khartoum is concerned I cannot see that health conditions are likely to be affected by such a scheme." (page 75). In spite of the two different meanings conveyed by the two sentences Dr. Balfour confined his opinion, given with reserve, to Khartoum. We believe that he based his opinion on the sanitary measures at Khartoum and expecting from them more than they are really capable of.

His opinion about the sanitary conditions of the regions of that reservoir, or rather of that vast lake swarming with dense layers of mosquitoes and bad water, is however coutrary to that of Dr. Chamers, his successor at the Wellcome Research Laboratories and the Sudan Health Department, given when the Nile was high in 1918, and remained so for a long time covering those areas resembling the proposed reservoir of Gebel el Awlia when the Nile is at its lowest stage.

It is also noticed that Dr. Balfour expressed his reserved view on April 10, 1911, at a time when the Nile did not cover more than one-sixth of the area to be covered with water the reservoir is full (*vide* page 55 of the Nile Control).

In addition to this he did not give his opinion on the harmful effects of these projects, from the sanitary point of view, on those who would drink only from the White Nile, whether Sudanese or Egyptians, and who would be deprived of the Blue Nile and its red Abyssinian waters, and also would have in their main river nothing but dirty and infected water coming from the filtration and drainage of the Gezira — such as would only make that of the White Nile greatly dangerous to health and poorly fit for cultivation.

Not contented by the opinion of Dr. Balfour, the Adviser of the Public Works Department went further to say that at the time the Aswan reservoir was made, similar fears were expressed as to its possible bad effect on sanitation, and there is every reason to believe that the fears about the White Nile dam are as groundless as those about the Aswan dam.

But we draw the attention of the Adviser to the fact that the sanitary conditions in Egypt have become worse since the erection of the Aswan dam, as can be ascertained from the reports of the Public Health Department, which appeared after its completion, especially in summer when the Nile is at its lowest stage.

Many diseases made their appearance among the people, the animals and plants of the country.

Malarial fever showed persistent tendency to increase and in spite of all measures, the Public Health Department is unable to expel it even from towns like Helouan, and other localities in Egypt and the Sudan. Typhus has become recently of a plague character even more rampant than it was at Galicia where its spreading was more than ever known to Europe during the great European war. Cases of typhoid of more acute form have become more frequent than ever known in this country. Septicemia hemorrhagica, cattle plague, cotton worm, clover worm, and other diseases attacking human, animal and plant life are manifest.

Had Sir M. MacDonald paid attention to the Sanitary reports issued in summer, that is at time when the Nile is at its lowest stage and nothing is stored up in the upper regions, he would have seen that the number of deaths is one and a half times as much as that of births. The only cause is the spreading of different diseases during the low Nile period when most of the water taken for drinking and irrigaton is taken from the Aswan reservoir.

It must be noticed also that then the number of deaths in Egypt surmounts the number of births. In Cairo, for example, according to the report of the Public Health Department, the number of births during the week ending May the 13th 1920 was 677 and that of deaths 751 that is with a difference of 74 in a single week. What would be the number of deaths during whole months when the river is at its lowest height ? It must also be noticed that 272 of the deaths were caused by different kinds of fever and that this number does not include those many cases which were not reported to the Public Health Department. Are those facts unworthy of serious consideration ? It is very clear also that conditions grow better when the flood is high and what good effects it produecs on man, animal and plant.

Assuming that the Adviser has examined the subject from the technical and engineering point of view, and that the criticisms in connection with the projects from that point are left to my technical colleagues, we can not conceal our astonishment to see him giving a medical decision upon the sanitary conditions that would result from the carrying out of the Nile Projects without very closely and scientifically examining them. It was imperative to appoint a mixed medical committee to examine the water of both the White and Blue Niles and to publish the results of their chemical, biological, and bacteriological analysis so as to give a correct opinion about the exact qualities of the water and its effects on the health of man, animal, and plant. To carry out these Nile projects without thoroughly and scientifically examining them, from all technical points of view by means of technical committees, is to expose this country to dangers which would threaten not only its people but also its plants and animals. Is it right, in the twentieth century with its civilization and scientific progress, that such important schemes, like the present reservoir projects, which would discharge the water of the low Nile period, that is the water stored for a year or more as we have already shown,to be used for irrigation and drinking purposes, could be carried out without scientific investigation by experts in pathology and hygiene associated with agriculturists, chemists and sanitary engineers and bacteriologists ?

Is it right to give a decisive judgment based on an opinion given with reserve from a single specialist, Lieut. Col. Dr. Andrew Balfour, on such a vital question, and that in 1911 ?

No doubt that the aphorism of Herodotus, the famous Greek historian, that Egypt is the land of wonders and contradictions still holds good for what is going on, in the land of the Pharaohs.

We repeat and remind the world that the Egyptian question is the question of the Nile, for, the existence and life of Egypt depend not on a part of the Nile but on the Nile as a whole.

Speaking in the interests of both Egypt and the Sudan, we conclude by insisting that whatever water is stored for the material development of both countries, be stored in the existing natural reservoirs, whether they be in the Lake Albert region or the Sudd region. In these localities the worst that can be done is already done, and the increasing of the depth of the water without increasing its surface, which will accompany the provision of extra storage, will go toward making the water less impure and not more impure.

We condemn, in the strongest terms we are capable of using, the creation of a new unhealthy region of shallow marsh and swamp, which will lose by evaporation 4 milliards of cubic metres of the 8 milliards stored on it, and which will breed disease and pollute water over an area inhabited to-day by 100,000 agriculturists and herdsmen, an area capable of great development, and one of the healthiest tracts in the whole Sudan.

We consider it inhuman to drive 100,000 people from their healthy homes, and at the same time, bring the dangers and diseases of the Sudd region within 50 kilometres of Khartoum.

I refer the Commission to paras: 22, 23, 24, 33, 35 and 41 of Sir John Roger's Report on "The Sanitary Aspect of Nile Reservoir" 1894. Rogers Pasha was Director General of the Sanitary Department of Egypt.

26/6/20. MAHGOUB SABITT, M.D.

* * *

THE BOND BETWEEN EGYPT AND THE SUDAN.

Modern policy has divided the Nile Valley into two distinct countries with two distinct nations and two distinct governments — the Egyptian Government and the Sudanese Government. Until recent times, however, the natural course was always followed, the two brother and inseparable peoples being united under one appellation and one system of government, since each was naturally a supplement and a complement of the other.

We do not wish to trace back our research into the ancient times and prove beyond question that the majority of the Sudanese are the descendants of our common forefathers, the Beduins of Upper Egypt, who migrated into Nubia and who established there an Arab Kingdom which subjected to its rule the whole of the Sudan. Suffice it to mention that at the beginning of the 19th century, when it came to the knowledge of Mohammed Aly, the founder of modern Egypt, that a European Power was intending to oppose his policy by occupying the sources of the Nile, he took the question into serious consideration and consulted many of the European engineers whom he had brought to Egypt. They were all of one opinion that the occupation of the Nile sources by a foreign Power would endanger the life of Egypt. Thereupon Mohammed Aly resolved to send an expedition to the Sudan, which country he soon conquered and brought under his sway.

Towards the end of the 19th century, England asked Egypt to relinquish the Sudan. Cherif Pasha thereupon took his famous historical attitude of opposition saying "If Egypt would give up the Sudan, the Sudan would not give up Egypt." And the noble minister preferred to resign with his Cabinet rather than take a part in that farce-tragedy.

It may be argued that we are quoting in support of our views the acts and statements of our own men who are naturally inclined to our side. But we shall now quote some of the statements of English politicians and engineers who played important parts in the modern history of Egypt since the British Occupation, proving the absolute necessity of the union of Egypt and the Sudan.

In 1904, Sir W. Garstin recommended the creating of an Irrigation Service in the Sudan and à propos of this he said " It is necessary that this service should be under the control of the Egyptian P. W. M., of which it should be considered a branch. This is an absolute and inevitable necessity. Its work will be purely technical and will comprise the construction of engineering works for the control of the Nile Supply. It must be remembered that the control of the Nile should remain in the charge of one and only one Department. Multiplicity of authorities in such a serious matter will be extremely dangerous. We have not the least doubt the Sudan Government would be the first to recognise and admit the truth of these remarks as well as have the least to hope for from the contrary. As Egypt is vitally interested in this affair it is only just that it should be charged with the expenses of the Irrigation Service to the exclusion of the Sudan."

We are at a loss to discover the technical or political influences which have come to existence since then and have eventually persuaded the Sudan Government to freely dispose of the Nile supply by concluding agreements with foreign companies and by conceding to them the right of drawing a certain amount of the Nile supply to the prejudice of Egypt's rights and interests. We are equally at a loss to know the reasons which persuaded the Egyptian Government to keep such a deep silence and to refrain from claiming its vested right of control over the Nile supply, which right was recognised and declared by Sir William Garstin 15 years ago.

When discussing the engineering works to be constructed on the Upper Blue Nile, Mr. Dupuis, the ex-Adviser for the P. W. M., said: —

" In this note we have referred, from a general point of view, to the political difficulties which come in the way of constructing and maintaining any of the works tending to control or regulate the utilisation of the lake waters (the reference is here to Lake Tsana). When the question, however, is considered from a detailed point of view, due attention should be paid to the necessity of settling and smoothing these political difficulties before any constructional work is commenced."

In our opinion Lord Cromer adopted this view when he said in his annual report of 1905 : —

" Lake Tsana lies within the dominions of the King of Abyssinia. No discussion of any project should be made without his approval. Moreover, there are many obvious objections to the construction of a big reservoir for the storage of an irrigation water supply for Egypt in a foreign land, however peaceful its ruler may be. Such a policy may eventually lead to political difficulties."

In his book on the Aswan Dam, Sir William Willcocks says (page 10):

" It should always be remembered that the discharge of Lake Victoria passes down the Ripon rapids where the width of the stream does not exceed 400 metres, which can be easily blocked up. As this lake is the main source of the Nile, it is obvious that whoever has it under his control will hold Egypt itself in his sway."

For this reason Sir William Willcocks enthusiastically applauded Mr. Chamberlain, the father of the present British Minister of Finance, when he exerted his famous endeavour towards the expulsion of German influence from the northern half of this great lake, and thus succeeded in bringing the whole district within the sphere of British influence.

In his paper on the " Nile Sudan " which he read to the Egyptian Institute on Jan. 20th, 1897, M. Prompt, the French engineer who was sent by the French Government and himself an Inspector General of the "Ponts et Chaussées," said :—

" The construction of a dam on the Upper Nile will endanger Egypt's life." In brief, Egypt's prosperity and life would be seriously endangered if the bond between it and the sources of the Nile were severed. It is therefore the duty of every Egyptian, nay of every lover of humanity, to prevent as best as he can the occurrence of this calamity. Be it known far and wide that the Egyptians are not trying to annex other's property or to extend their own dominions or to consolidate their own boundaries; they are simply asking for what is their due right, viz., the restoration of a part of their own country which has been separated by the wily and oppressive hand of might. They are acting under the deep rooted belief that

" EGYPT AND THE SUDAN ARE AN INSEPARABLE WHOLE "

It is not the consideration that the gifts of nature in the Sudan — the heat of the sun, the fertile soil and the plentiful water supply — have stirred up the covetous hopes of some British Imperialists and induced them to lavish their gold on the execution of their imperialistic schemes and the importation of labour from far off lands — we say it is neither this nor any similar consideration which urges the Egyptians to claim the liberation of the Nile sources from every foreign influence. It is only the one vital principal: *The Life of Egypt and the Interests of the Sudanese Themselves.*

CONCLUSION.

By submitting this note, it is not our intention to stand as a stumbling block in the way of the proposed projects nor of any other engineering works which may tend to increase the supply of the Nile or prevent the loss of a single drop of its waters. Our sole object is to make clear the injuries that are sure to befall both Egypt and the Sudan in case the projects are executed in their present form.

The projects under question are not of those ordinary public works which may be lightly taken in hand, and of which the loss their execution would entail in case they eventually proved defective does not exceed the cost of their construction. On the contrary, they are of such vital importance as can hardly be exaggerated. On them depends the lives of two nations. It is therefore quite unreasonable to charge with the preparation of such projects persons from whose Reports on the subject the following facts have been revealed :

1. Obvious inconsistencies in the figures on which the projects are based.
2. A tendency on the part of the Adviser to reduce in all his calculations the amount of the cultivated area and consequently the quantity of water required for cultivation; and thereby reduce the water requirements of Egypt and the Sudan in order to justify and support his projects.

3. We have examined and proved conclusively in this report that Sirry Pasha and Sir Murdoch MacDonald, the Adviser, have attempted to keep the whole question in perfect secrecy until everything was finally settled and decided.

4. The criticisms and objections raised against the projects by Sir William Willcocks and Kennedy Pasha, and the charges concerning the alteration of figures and water levels and the concealment of certain documents.

All these considerations make it absolutely necessary to revise all the projects by means of a mixed committee of native and foreign engineers who should be free from all bias and who should not be influenced in the least manner by the promoters of the projects. This is the only way to safeguard the interests of our country and to avoid the injuries which may befall us through a careless examination of this vital matter.

To the very last, we unyieldingly object to the construction on the Blue Nile of any work which may tend to cut off or to decrease the supply of water and silt which flows down to Egypt from that river. We have already explained the reason for this, and we are perfectly convinced that Egypt has in this connection a vested right which she possesses for more than 6,000 years.

We also prefer that the water which is to be stored for the benefit of Egypt should, whenever possible and at whatever cost, be kept in reservoirs within Egyptian boundaries. When this is not possible the reservoirs should be constructed on sites upon which no political difficulties are likely to arise in the near or far future.

For reasons given in our Report we have concluded that no project be carried out until it has been studied far more thoroughly than this one. It should then be formally submitted to the Egyptian parliament whose decision will be final. We say this because this project is far reaching and of vital importance to both the wealth and the health of the whole country.

As for Nag Hamadi Barrage we consider it as a work which should have been achieved many years ago, in order to prevent the occurrence of sharaqi in Upper Egypt in low years and in order to provide the necessary summer supply for perennial irrigation later on.

In conclusion we beg to quote a word which was written by Sir Murdoch MacDonald in the Irrigation Report for 1912: "Egypt without irrgation would be lost from existence and would become a part of the surrounding desert. But the Sudan is favoured with an advantage as it lies within a rainy zone whose supply of rain water can adequately meet all its requirements if it is carefully and systematically organised."

Have natural conditions been so radically changed in both Egypt and the Sudan, that the Adviser has so changed his opinion in 1920 ?

(Signed) :	Abdalla Pasha Wahbi.	Ibrahim Zaky.
	Moussa Pasha Ghalib.	Mohamed Ismail Bey.
	Abdel Kawi Ahmed.	

This is the English translation that we have approved.

26/6/1920. Abdalla Wahbi.

Copy of Report submitted by Abdalla Pasha Wahbi to the Nile Projects Commission.

30/6/1920. (Signed) : J. L. Capes.

ABDALLA PACHA WAHBY
25, Soliman Pasha St.

Cairo, 21st June, 1920.

The Secretary,
Nile Projects Commission,
M. P. W.
CAIRO.

SIR,

We wished to know the lowest recorded gauges at Roda to compare them with 1913-1914 and we found in Kutat Tawfikia by Ali Pasha Mobarek and the Official Journal the following information :—

		FLOOD			FLOOD			FLOOD			FLOOD
YEAR	KIRAT	PIC	YEAR	KIRAT	PIC	YEAR	KIRAT	PIC	YEAR	KIRAT	PIC
629	5	14	—	—	—	—	—	—	948	12	15
632	7	15	761	12	15	831	10	15	964	04	15
633	9	13	762	14	15	832	6	14	966	19	14
650	21	14	764	19	14	833	—	15	967	17	12
651	12	15	769	1½	15	834	10½	15	980	4	15
653	12	15	771	15	15	837	22	14	981	2	15
687	4	15	778	12	15	851	15	15	1006	16	14
688	6	13	779	15	15	887	7	15	1007	9	14
693	15	14	780	15	15	888	8½	15	1023	14	14
694	9	13	781	1	14	894	10	15	1036	9	15
695	7	14	784	15	15	895	22	14	1067	6	15
696	17	13	788	2½	15	903	4	13	1082	10	15
705	18	13	789	3	15	906	11	15	1085	5	15
712	1	14	791	18	14	927	17	14	1096	17	13
722	11	15	796	9	15	931	4	15	1159	1	15
726	4	15	799	23	14	938	21	14	1200	21	12
733	20	14	802	22	14	940	13	15	1210	7	15
734	½	14	803	2	14	944	12	15	1244	—	15
735	20½	14	816	18	14	945	6	15	1294	7	15
737	6	15	828	15½	15	946	8	15	1450	7	15
759	13	15	830	21	13	947	17	14	1913	16	15

The above table shows that the Roda Gauge reading of 15 pics 16 kirats for 1913 was not the lowest ever recorded for the Nile on that gauge. Readings for 81 years were actually lower than that reading for 1913, and the lowest was that for the year 967, when the gauge reached 12 pics and 17 k. only. This reading is about 2 pics, 23 k. lower than that for 1913 and that is a great variation for a river like the Nile.

It must be remembered that in 1913, regulation was made on the Assyut and Esna barrages, which lessened the height of the flood at Roda. This lessening was increased by that deep Sefi canal the Ibrahimieh taking off above the Assyut barrage and *lowering the Nile itself by one pic.*

In addition to the above we note that formerly all irrigation was by basins, while in 1913, the deep and important Sefi canals near Cairo helped to further lower the Roda guage.

A third and most important factor in making comparison with the earlier years is the fact that previous to Mohammed Ali's time the population of Egypt was only 2,000,000, as against 14,000,000 to-day, and the basin canals of those days only took a small part of the water they take to-day. *This would account for over 2 pics in height on the Roda gauge, while the rise of the river bed is only 4 kit. for 100 years or one pic in 600 years.*

The above three facts, when used for purposes of comparison, lead to the conclusion that there were a far greater number of years lower than 1913 than are contained in this list.

Yours faithfully,

Abdalla Wahby.

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